PESTICIDES ABSTRACTS

June 1980 - Vol. 3, No. 6
Abstracts
PSTAB 13(06)

Quarterly Index Issue

U.S. ENVIRONMENTAL PROTECTION AGENCY

U.S. ENVIRONMENTAL PROTECTION AGENCY
OFFICE OF PESTICIDES AND TOXIC SUBSTANCES

Chemical Information Division
RM E-447 401 M Street, S.W.
Washington, D.C. 20460

PESTICIDES ABSTRACTS (formerly Health Aspects of Pesticides Abstract Bulletin) is a monthly publication of the Chemical Information Division of the Office of Pesticides and Toxic Substances, Environmental Protection Agency.

The purpose of this publication is to foster current awareness of the major worldwide literature pertaining to the effects of pesticides as defined in the Table of Contents. The publication represents a monthly review of more than 2,000 primary and secondary sources. A list of periodicals from which articles have been abstracted appears annually in the January issue. Subjects and authors of abstracted articles are cross-referenced in quarterly and annual indexes. Reprint requests should be directed to the author of the complete article.

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80-1501. Fine, D. H. (New England Inst. Life Sci., Waltham, MA) **N-nitroso compounds in the environment.** *Adv. Environ. Sci. Technol.* 10: 39-123; 1980 (17 references).

A review of N-nitroso compounds in the environment is presented. Their formation in the environment is discussed, including the chemistry, and sources of primary, secondary and tertiary amine compounds. Sources of primary amines include the insecticide menason and the herbicide amitrole. The pesticides atrazine, carbaryl, monuron and fenuron are secondary amines. Tertiary amine compounds which have been N-nitrosated, including several insecticides, fungicides and herbicides, are presented in tabular form. The sources and chemistry of the oxides of nitrogen (NO, NO_2, N_2O_3 and N_2O_4) are described. Analysis for N-nitroso compounds by thermal energy analysis, thin layer chromatography, spectrophotometry, polarography and gas chromatography are discussed. The human health aspects of N-nitroso compounds are complex, arising from exposure by inhalation, ingestion or dermal contact. Examples of pesticide exposure include a pesticide spill (dermal exposure) and inhalation exposure during aerial spraying. The N-nitrosodimethylamine (NDMA) content of the dimethylamine salts of the herbicides 2,4-D, MCPA and 2,3,6-TCBA (2,3,6-TBA) are given. The N-nitrosamine content of some dinitroaniline herbicides (trifluralin, isopropalin, oryzalin, butralin and benefin) are presented in tabular form.

80-1502. Sosnovaya, O. N.; Merezhinskii, Yu. G.; Timofeev, M. M.; Zhuravaskaya, Z. F. (Inst. Plant. Physiol., Kiev, USSR) **Vliyanie gerbitsidov na fraktsonnyi sostav kislotorastvorimogo fosfora list'v kartofelya i red'ki dikov i zqvisimosti ot uslovii pitaniya. [Effect of herbicides on the fractional composition of acid-soluble phosphorus of potato and wild radish leaves as a function of nutrition.]** *Agrokhimiya* (12): 111-118; 1978 (10 references) (Russian).

The effect of herbicides prometryne and linuron on the fraction composition of acid-soluble phosphorus was studied in leaves of sensitive wild radish and resistant potato. Herbicides were applied with or without fertilizers in the vegetative vessels prior to the emergence. Application of herbicides (at a rate of 2.5 kg/ha) against the optimal level of nutrition increased the level of both inorganic and organic fractions of the phosphorus in leaves of potato, but decreased the level of organic phosphorus in the leaves of wild radish. In the absence of fertilizers, herbicides increased the level of inorganic phosphorus in potato leaves.

80-1503. Filippova, N. V.; Timofeeva, A. A. (All-Union Res. Inst. Fertilizers & Agrotech., Moscow, USSR) **Vliyanie linurona na urozhai kachestvo morkovi pri razlichnom urovne kaliinogo pitaniya. [Effect of linuron on the yield and quality of carrots at different levels of potassium nutrition.]** *Agrokhimiya* (3): 116-119; 1979 (5 references) (Russian).

The results of field and vegetative trials of the effect of linuron on the yield of carrot at different levels of potassium nutrition are presented. Linuron was applied at a rate of 2 kg/ha on day 2-3 after the planting. There was a 5-15.4% increase of the yield, as compared to crops not treated with linuron. The phytotoxicity of linuron for sensitive oat crops was evaluated in vegetative experiments. It was found that the phytotoxicity of the herbicide decreased with increased levels of potassium nutrition.

80-1504. Bowes, J.; Crofts, A. R.; Arntzen, C. J. (Dep. Physiol. Biophys., Univ. Illinois, Urbana, IL 61801) **Redox reactions on the reducing side of photosystem II in chloroplasts with altered herbicide binding properties.** *Arch. Biochem. Biophys.* 200(2): 303-308; 1980 (16 references).

Studies were performed to determine the effects of herbicides on the redox reactions of photosystem II in the chloroplasts of triazine-resistant and triazine-susceptible redroot pigweed (*Amaranthus retroflexus*). Fluorescence measurements were made of chloroplasts suspended in 0.1 *M* sorbitol, 10 m*M* NaCl, 5 m*M* $MgCl_2$ plus 10 m*M* tricine-NaOH (pH 7.8). Measurements of fluoresence yield were made following a saturating lasar flash. The fluorescence was determined to indicate the electron transfer from the primary acceptor (Q) to the bound quinone (B) in photosystem II. The electron transfer was 10 times slower in chloroplasts of the susceptible pigweed than for the resistant. When exposed to atrazine the susceptible pigweed showed a rate much slower than for those not exposed. For the Q decay following a series of flashes the binary oscillations of the susceptible pigweed were in the opposite phase of the resistant type. It is suggested that the apoprotein of B is different in photosystem II of the two plant types, which results in differing binding affinity of the herbicides. This differing affinity may alter the redox properties of B.

80-1505. Burges, H. D. (Glasshouse Crops Res. Inst., Littlehampton, Sussex BN16 3PU, England) **Control of wax moths: physical, chemical and biological methods.** *Bee World* 59(4): 129-138; 1978 (45 references).

Methods for controlling greater and lesser wax moths are reviewed. Both physical and chemical methods are suggested for use after the bees have been removed from the combs and infested structures. Suitable chemical methods employ poisonous gases such as ethylene oxide, ethylene dibromide, and phosphine (aluminum phosphide) which are safer than the highly poisonous methyl bromide. The latter is highly dangerous, but very effective. Biological methods, including *Bacillus thuringiensis*, are also discussed.

80-1506. Hwang, Y. S.; Mulla, M. S. (Dep. Entomol., Univ. California, Riverside, CA 92521) **Chemicals of the future.** *Calif. Agric.* 34(3): 32-33; 1980.

Recent research on the use of ecological chemicals with significant biological activity on mosquitos is summarized. Biologically produced substances than influence behavior, growth, survival and population biology are considered. Simple lower carboxylic acids, produced by microbial action on standard animal feed, have been shown to inhibit oviposition. Extracts of Eurasian watermilfoil have been discovered to be toxic to adult mosquitos and mosquito larvae. The algae *Chlorella ellipsoidea* causes mortality in the first stage larvae of the mosquito *Culex quinquefasciatus.* Under extremely overpopulated conditions, older larve of *C. quinquefasciatus* secrete autoinhibitors which lead to the death of younger larvae. These autoinhibitors have been found to be a mixture of branched-chain fatty acids and hydrocarbons, and the most promising substances in this category are 3-methylnonadecanoic acid, *N,N*-demethylhexadecamide and their homologs. The amides show a wide spectrum of toxicity against all stages of larvae and pupae, while the acids are highly toxic only to first-stage larvae of *C. quinquefasciatus.*

80-1507. HaNgoc, K. A. (Lab. Physiol. Veg., Croissance, Univ. Paris VII, F-75230 Paris, France) **Action de l'acide 2,4-dichlorophenoxyacetique et de l'acide 2,4,5-trichlorophenoxyacetique sur la croissance des filets staminaux du *Zea mays.* Etude de l'activite saccharasique et des modifications ultrastructurales des parois cellulaires au course de leur allongement. [Action of 2,4-D and 2,4,5-T on the growth of staminal filaments of *Zea mays.* Study of the saccharase activity and of the ultrastructural changes of the cell walls during their elongation.]** *Can. J. Bot.* 58(1): 1-13; 1980 (19 references) (French).

Growth stimulants such as gibberellins or auxins cause elongation of immature staminal filaments of *Zea mays* L. before anthesis. Low concentrations of 2,4-D and 2,4,5-T simultaneously stimulate elongation and saccharasic activity. In contrast, high concentrations do not stimulate elongation and inhibit saccharasic activity. Ultrastructurally the 2 chemicals reduce the thickness of cellular walls. A supplemental layer was found to form in the pericellular space of all cells of staminal filaments incubated in both control solutions and those containing the above substances. The thickness of this layer varies with their concentration.

80-1508. Stephenson, G. R.; Phatak, S. C.; Makowski, R. I.; Bouw, W. J. (Dep. Environ. Biol., Univ. Guelph, Guelph, Ontario N1G 2W1, Canada) **Phytotoxic interactions involving metribuzin and other pesticides in tomatoes.** *Can. J. Plant. Sci.* 60(1): 167-175; 1980 (12 references).

Metribuzin was tested for phytotoxic interactions with 16 pesticides on tomato (*Lycopersicon esculentum,* Mill. 'Heinz 1706'). Synergistic phytotoxic interactions were repeatedly observed with metribuzin in combination with either malathion or carbaryl under growth room conditions. Additive phytotoxicity to tomato was commonly observed with metribuzin plus chlorothalonil, diazinon or demeton but few interactions were observed with metribuzin in combination with 11 other pesticides. Under field conditions synergistic phytotoxicity was observed with metribuzin plus carbaryl but not with metribuzin plus malathion. In growth room studies, synergistic interactions with either carbaryl or metribuzin could be avoided if the application of the insecticide was delayed at least 3 days after metribuzin application. Malathion or carbaryl did not increase the foliar penetration of metribuzin but pretreatment of tomato plants with either insecticide did inhibit the metabolism of metribuzin in tomato leaf tissue. (Author abstract by permission)

80-1509. Hunter, J. H. (Res. Stn., Agric. Canada, Regina, Saskatchewan S4P 3A2, Canada) **Propanil for control of green foxtail in wheat and barley.** *Can. J. Plant. Sci.* 60(1): 177-184; 1980 (5 references).

In a series of field and greenhouse experiments, propanil (3′,4′-dichloropropionalide) as a postemergent herbicide provided excellent control of green foxtail (*Setaria viridis* (L.) Beauv.) in wheat (*Triticum aestivum* L.) and barley (*Hordeum vulgare* L.). Although some initial chlorosis occurred, wheat and barley recovered quickly and were considered tolerant to propanil at up to 1 kg/ha applied over a growth period extending from the 2- to 8-leaf stages of the green foxtail. Propanil at rates greater than 1 kg/ha resulted in considerable chlorosis and leaf tip burn, and although grain yields were not reduced, crop tolerance was visually assessed as unsatisfactory. Analysis indicated that at the 2 and 4 kg/ha rate of propanil the residues in wheat and barley disappeared very quickly. At harvest, wheat grain contained 0.09 ppm of propanil. (Author abstract by permission, abridged)

80-1510. Hatton, T. T.; Cubbedge, R. H. (Agric. Res., SEA, USDA, Orlando, FL 32803) **Phytotoxicity of methyl bromide as a fumigant for citrus.** *Citrus Ind.* 61(3): 21-24, 26; 1980 (7 references).

Studies were performed on the phytotoxic effects of methyl bromide (MB) on grapefruit, orange and Temple. The fruit was collected from various packing houses in Florida and packed in standard 4/5 bushel cartons. The cartons were placed in air-tight chambers and graduated amounts of MB were administered. After fumigation, the fruit was stored at optimal storage temperature for 28 days. Tests were performed to determine the type and extent of fumigation injury as well as the type and extent of fruit decay. Results on grapefruit indicate that as much as 28% of

a test lot were injured and 13% decayed after 28 days, and as much as 73% were decayed after holding at 79°F for 7 days. Several test lots of oranges underwent 100% decay after holding at 70°F for 7 days. There was great variation in injury and decay rate, including some test lots where none occurred. It is concluded, however, that at the application rates necessary for the control of the Caribbean fruit fly, phytotoxic effects are excessive.

80-1511. Zutshi, M.; Saxena, Y.; Jayadevi (Dep. Zool., Univ. Rajasthan, Jaipur, India) **Effect of juvenile hormone analogue ZR-515 on the last instar nymphs of *Dysdercus cingulatus* Fabr. (Pyrrhocoridae: Heteroptera).** *Curr. Sci.* 48(2): 89-90; 1979 (7 references).

The last instar nymphs of *Dysdercus cingulatus* were used to test the activity of the juvenile hormone analog ZR-515 (Altosid). Juvenile hormone analog (JHA) (2 μl/insect) was applied topically in two concentrations (0.25 and 0.5%) on the dorsal surface with the aid of a micropipette. The application of synthetic JHA prevented the molting of the last instar into adult. At the 0.25% concentration, 30% molted into normal adults, while at the 0.5% concentration, only 10% did so. The mortality was 50% and 60% when treated with 0.25% and 0.5% concentrations, respectively, and only 10% in control. In addition, malformed adults also occurred, with 20% being malformed with 0.25% concentration, and 30% malformed with 0.5% concentration.

80-1512. Koeppe, D. E.; Cox, J.K.; Gruenwald, P.J. (Dep. Agron., Univ. Illinois, Urbana, IL 61801) **Maize mitochondrial structure and function: the selective ionophorelike effects of methomyl on Texas-male-sterile cytoplasm mitochondria.** *Dev. Plant Biol. Vol. 1. Plant Mitochondria.* Ducet, G. and Lance, C., eds. (Elsivier Biomed. Press: Amsterdam): 419-426; 1978 (17 references).

Texas-male-sterile (T) and normal fertile (N) maize seedlings were used to study the effects of the carbamate insecticide methomyl, *Bipolaris maydis* (race T) (BmT) toxin, and valinomycin. Mitochondria were isolated from shoots containing N or T cytoplasm and were separated by density in 10-25% dextran-40 continuous concave density gradients. Mitochondria were layered on 11 ml gradients, and isopycnic centrifugation was carried out in a swinging bucket rotor. The gradient was fractionated and absorbance monitored at 580 nm. Methomyl stimulated NADPH oxidation and initiated swelling in heterogenous populations of T mitochondria, while kaempferol inhibited the respiratory burst and reduced the methomyl-induced swelling. Fraction patterns of T and N mitochondria were similar after centrifugation. Although T mitochondria of all densities were affected by methomyl, mitochondria of intermediate density showed the greatest response. Since methomyl caused no apparent membrane disruption, it is suggested that it and BmT specifically and primarily influence the K+ and/or Pi transport mechanism(s) of T mitochondria in a manner similar to the non-cytoplasmic selective effects of valinomycin.

80-1513. Egan, H. (Lab. Gov. Chem., London SE1 9NQ, England) **Analytical testing procedures: a critical review.** *Ecotoxicol. Environ. Saf.* 4(1): 77-84; 1980 (16 references).

A review of analytical testing procedures is presented. Testing procedures are divided into those in which evaluation is done by controlled experiments; those concerned with chemical and allied methods of detection, identification and estimation; and systems of data accumulation. Examples of data systems given include the FAO/WHO system and the Pesticide Safety Precautions Scheme. Trends in analytical chemistry show that collaborative analysis and standardized methods have become more important in recent years. Multipesticide analysis is considered to be the most difficult area of analytical chemistry, requiring intra- and interlaboratory quality control. It is suggested that even though ecotoxicological assessments have become more standardized, there should be more work on the international level to further harmonize many aspects of this area of research.

80-1514. Dost, F. N. (Oregon State Univ., Corvallis, OR 97331) **Natural carcinogenic products.** *Environ. Sci. Technol.* 14(2): 128; 1980.

In this letter to the editor data used by the EPA in studying exposure to 2,4,5-T in Oregon is discussed. It is suggested that the data does not show evidence of any increased rate of miscarriages in the population there. Methods used in sampling and data acquisition are questioned. It is concluded that the majority of known miscarriages occurred in 4 coastal cities, where exposure to the herbicide was unlikely.

80-1515. Retnakaran, A.; Kaupp, W.; Howse, G. (For. Pest Manage. Inst., Sault Ste. Marie, Ontario, Canada) **Experimental aerial application of insect growth regulators against the spruce budworm, *Choristoneura fumiferana* (Clemens) in Thessalon (1976) and Hearst (1977).** *For. Pest Manage. Inst. Rep.* FPM-X-19: 29 pp.; 1979 (15 references).

Oil formulations of 140 g/ha of Dimilin (diflubenzuron), and 280 and 560 g AI/ha RO-103108 were sprayed aerially on spruce-fir-pine forests in 1976. Single sprayings of Dimilin at 140 g/ha resulted in only 50-60% reduction of the 4th instar spruce budworm larvae. The best control (59%) occurred on balsam fir, while only 3% foliage protection occurred on white spruce. RO-103108 at 280 g/ha had no visible effect but at the higher rate of 560 g/ha there

was an 18% population reduction on balsam fir and 55% on white spruce. Dimilin applied twice within a 1 wk period caused 78% reduction in spruce budworm populations and provided good foliage protection on white spruce. In field trials in 1977, and juvenile hormone analogs PH 60-41 at rates of 70 and 140 g/ha, and 14 g/ha EL-494 (a molt inhibitor) caused 70 and 60% reductions in insect numbers, respectively, on both balsam fir and white spruce.

80-1516. Khizhniak, N. I.; Brui, G. F.; Sytenko, M. A.; Gol'denberg, B. I. (Reg. Sanit. Epidemiol. Stn., Kiev, USSR) **Opyt osushchestvleniia sanitarnogo nadzora za okhranoi pochvy v sviazi s khimizatsiei sel'skogo khoziaistva. [Experience with sanitary surveillance for soil protection prompted by the chemicalization of agriculture.]** *Gig. Sanit.* 45(1): 64-65; 1980 (Russian).

Activity of the Kiev Sanitary Service in the field of protection of the environment from pollution with pesticides is reviewed. The amount of pesticides used in the Kiev Region is increasing constantly, which in turn increases the hazard of environmental pollution. The prime objective of the sanitary-epidemiological station is the surveillance for the zoning of the territory, control for formulation of the pesticide solutions, and the working conditions of the spraying equipment. The Sanitary Service is involved in replacing the stable organochlorine pesticides by less persistent organophosphorus compounds, increasing the scope of biological methods of pest control, strict control for storage of pesticides, and limiting of the aerial methods of pesticide application. During the past 10 yr, contamination of water decreased 77-fold, contamination of food products decreased 22.6-fold, and contamination of the soil decreased 2.5-fold.

80-1517. Sanders, C. J. (Great Lakes For. Res. Cent., Sault Ste. Marie, Ontario, Canada) **Spruce budworm mating disruption trials, using synthetic attractant in Conrel fibres. (Ontario, 1977).** *Great Lakes For. Res. Cent. Rep.* O-X-285: 32 pp.; 1979 (8 references).

11-Tetradecanol (*cis:trans*, 92.37:7.63) in Conrel open-ended fibers was applied by 10 aerial applications to trial fields at a theoretical application rate of 6000 fibers/ha per application to yield release rates of 0.208 μg/fiber/hr. The total actual deposits were estimated to be between 32,500 and 34,000 fibers/ha. The actual release rates of 11-tetradecanol are not known. The number of males caught in sticky traps were averaged daily and reductions of 97.3-99.4% were observed with the attractant. A significant reduction in the number of eggs laid in the treated plots was also observed. However, the overwintering populations of second instar larvae were estimated and no significant differences between control and treated plots were noted. It is concluded that the treatments did not have any effect on the post treatment population, possibly due to migration into the treated areas by gravid females from nearby untreated areas.

80-1518. Rao, P. R. M.; Prakasa Rao, P. S. (Cent. Rice Res. Inst., Cuttack, Orissa 753 006, India) **Note on the use of *Bacillus thuringiensis* and extracts of *Eclipta alba* (Linn) Hassk. and *Azadirachta indica* A. Juss. for the control of rice brown planthopper.** *Indian J. Agric. Sci.* 49(11): 905-906; 1979.

Suspensions of *B. thuringiensis* (Thuricide HP) in 0.25-1.0% concentrations, root and shoot extracts of *Eclipta alba*, and aqueous extracts of leaves of neem (*Azadirachta*) plants were sprayed on rice plants. At 1 hr after spraying, 10 adult brown planthopper insects/plant were released and mortality counts were taken 24 and 48 hr after spraying. All doses of Thuricide gave complete control of the insects, while *E. alba* extracts and neem leaf extracts killed 70 and 55-100% of the pests, respectively.

80-1519. Rudzinski, W.; Echegoyen, L.; Jobin, W. (Dep. Chem., Southwest Texas State Univ., San Marcos, TX 78666) **Isolation, characterization, and toxicity of (*O,O'*-dimethyl phosphorodithioato)copper complexes.** *J. Agric. Food Chem.* 28(2): 469-472; 1980 (13 references).

The products of reaction between *O,O'*-dimethyl phosphorodithioate (DMPDT), a degradation production of malathion and dimethoate, and copper(II) have been identified. (*O,O'*-dimethyl phosphorodithioate) copper(I), Cu_2DMPDT_2, is the major product of reaction, and it has been isolated and characterized and its toxicological properties have been evaluated. Cu_2DMPDT_2 exhibits unusual behavior when dissolved in chloroform; it immediately oxidizes and forms bis[(*O,O'*-dimethyl phosphorodiothoate)] copper(II), $CuDMPDT_2$. This has been verified using electron spin resonance and visible spectroscopy. Since mollusks are very sensitive to even small amounts of copper(II), the toxicity of Cu_2DMPDT_2 has been evaluated. Cu_2DMPDT_2 exhibits no toxicological effects toward the snail (*Australorbis glabratus*) and, therefore, would be ineffective in the control of bilharzia (schistosomiasis). $CuDMPDT_2$, another product of reaction, cannot be isolated from a mixture of phosphorodithioates. ^{31}P NMR unequivocally demonstrates a mixture of 4 phosphorodithioate and 2 phosphonate reaction products in acetone. (Author abstract reprinted by permission of the American Chemical Society)

80-1520. Weigand, D. A. (Author address not given) **Agent Orange and skin rash - a different experience.** *J. Am. Med. Assoc.* 243(14): 1422-1423; 1980 (1 reference).

Agent Orange (2,4,5-T) as the cause of persistent skin disease among Vietnam veterans is questioned in this letter to the editor. Examination was made of 16 veterans with histories of exposure to the herbicide that varied from single, mild indirect exposure to affected vegetation, to repeated heavy, direct cutaneous exposure over a 3-yr period. Only 2 of the patients experienced any indication of skin disease at the time of the exposure. None had any history of subsequent skin eruptions or lesions.

80-1521. Cook, R. R. (Dow Chem. USA, Midland, MI) **Agent Orange and spontaneous abortions.** *J. Am. Med. Assoc.* 243(14): 1423; 1980 (1 reference).

The link between spontaneous abortions and Agent Orange (2,4,5-T) is questioned in this letter to the editor. It is suggested that the statistics quoted in an earlier article claiming 130 spontaneous abortions during a 3 mo study period in areas sprayed with 2,4,5-T are erroneous. Contrary to these figures the EPA Alsea study has found only 188 abortions during a 72 mo period (~ 2.6 abortions/mo). The methodology used calculating the abortion rate is also questioned.

80-1522. Pinchin, R.; Oliveira Filho, A. M. d.; Figueiredo, M. J.; Muller, C. A.; Gilbert, B.; Szumlewicz, A. P.; Benson, W. W. (Nucleo Pesquisas Prod. Nat., Cent. Cienc. Saude, Univ. Federaldo, Rio de Janiero, Brazil) **Screening and structure-activity relationships of synthetic juvenile hormone analogues for *Panstrongylus megisus*, a primary vector of Chagas' disease in Brazil.** *J. Econ. Entomol.* 71(6): 950-955; 1978 (27 references).

Results are reported on the bioassay of 40 compounds for juvenile hormone activity on *Panstrongylus megistus* (Burmeister), a transmitter of Chagas' disease in Brazil. Compounds of several different structural classes (aliphatic branch chain compounds, aromatic terpenoid ethers, and derivatives of *N*-geranylaniline) were tested by applying 0.01-10 μg of juvenile hormone analog (JHA) dissolved in solvent to the dorsal abdomen of each insect. As the nymphs molted, the degree of juvenilization based on external characteristics and the presence of sterility was determined. High levels of activity were observed for some aromatic terpenoid ethers and amines. The most active compound was *N*-(5-chloro-2-methylphenyl) -3,7-demethyl-2,6-octadienylamine, with an application of 0.1 μg/insect resulting in a high degree of juvenilization. It is noted that in this insect, the presence of an electronegative group, such as an alkoxy or chlorine *meta* to the terpenoid side chain, is a prerequisite for high juvenile hormone activity.

80-1523. Martinez-Pardo, R.; Ribo, J.; Primo-Yufera, E. (Inst. Agroquim. & Tecnol. Aliment., Valencia, Spain) **Activity of juvenile hormone mimics against the Mediterranean fruit fly.** *J. Econ. Entomol.* 72(3): 437-440; 1979 (24 references).

Nine juvenile hormone analogs (juvenoids) were tested on all developmental stages of the Mediterranean fruit fly, *Ceratitis capitata*, to study the possibilities of hormonal control methods. Eggs were evenly deposited on moist filter paper discs previously treated with juvenoid and egg hatch was determined. Penultimate and last-stage larvae were treated topically with 1 μl of juvenoid acetone solution/insect or fed treated diets, and delays in pupation were recorded. Both prepupae and pupae were treated topically; a reduction of normal emerging adults was observed. Adult flies less than 18 hr old were treated topically with 4 μl of juvenoid acetone solution or were fed the juvenoid in the diet and percent reduction in reproduction was recorded. The various developmental stages were found to be affected differently by the 9 juvenoids tested. The hormones most effective for each stage are listed. Compounds containing aromatic structures were of significant ovicide activity, while open chain compounds were more active in morphological tests. In an *in vitro* gonadotropic assay, ovaries from newly emerged females were cultured with juvenoids at concentrations of 0.005 to 5 ppm and oocyte development was recorded. Both types of chemicals showed similar gonadotropic activity, indicating that both types of juvenoids are true juvenile hormone mimics.

80-1524. Miura, T.; Takahashi, R. M. (Mosq. Control Res. Lab., Univ. California, Fresno, CA 93727) **Effects of the insect growth inhibitor SIR 8514 on hatching of southern house mosquito eggs.** *J. Econ. Entomol.* 72(5): 692-694; 1979 (5 references).

When eggs of *Culex quinquefasciatus* Say were exposed to water treated with SIR 8514 (2-chloro-*N*-[[[4-(trifluoromethoxy) phenyl]amino] carbonyl]benzamide) abnormal hatching (longitudinal split of shell or partial hatching) as well as ovicidal activity resulted; younger embryos (0.5-4.5 hr) were the most sensitive and older embryos (23.5 hr) were tolerant. Abnormal hatching and ovicidal activity also were produced by baiting adults with SIR 8514 in sucrose. The compound showed no effect on egg hatchability when applied as a contact film to adult mosquitoes. (Author abstract by permission)

80-1525. Ottens, R. J.; Todd, J. W. (Georgia Coast. Plain Exp. Stn., Univ. Georgia, Tifton, GA 31794) **Effect of diflubenzuron on reproduction and development of *Graphognathus peregrinus* and *G. leucoloma*.** *J. Econ. Entomol.* 72(5): 743-746; 1979 (9 references).

Reproductive inhibition by the juvenile hormone analog diflubenzuron (Dimilin) was demonstrated in the whitefringed beetles, *Graphognathus peregrinus* (Buchanan) and *G. leucoloma* (Boheman). Direct application to eggs of *G. peregrinus* caused substantial reduction in hatchability, with young eggs (0-14 days old) slightly more susceptible than older eggs (15-28 days old). Application to prepupal larvae of *G. peregrinus* significantly reduced adult eclosion. Adult *G. peregrinus* and *G. leucoloma* fed diflubenzuron treated foliage in the laboratory produced eggs with greatly reduced or no hatch. In studies using potted plants in the field, larval populations resulting from adults that fed on diflubenzuron treated soybean plants were much lower than those of the untreated checks. (Author abstract by permission)

80-1526. Anonymous **The Institution of Water Engineers and Scientists comments on the seventh report of the Royal Commission on Environmental Pollution: *Agriculture and Pollution.*** *J. Inst. Water Eng. Sci.* 34(1): 12-14; 1980.

Comments and suggestions by the Institute of Water Engineers and Scientists to the 7th annual report of the Royal Commission on Environmental Pollution include recommendations on pesticides and nitrite fertilizer usage, disposal of farm wastes, and farm planning. It is suggested that advance warning be given by pesticide users to waste plant operators when aerial pesticide spraying is conducted. Such cooperation is particularly important where rivers themselves are likely to receive chemicals either from direct spraying or from land runoff.

80-1527. Khasanov, V. Kh. (Uzbek Res. Inst. Hyg. Sanit. & Occupat. Dis., Tashkent, USSR) **Sovremennye gigienicheskie problemy planirovaniia khlopkovodcheskikh raionov v sviazi s primeneniem pestitsidov. [Current hygienic problems of planning of cotton-growing regions associated with the use of pesticides.]** *Med. Zh. Uzb.* (11): 42-45; 1979 (Russian).

Some characteristic features of pollution of the environment with pesticides in cotton-growing regions are reviewed. Major factors influencing contamination of environment were found to be the small-farm system of settlement, decentralized water supply from the superficial bodies of water and alternate location of plantations of cotton and food crops. It was emphasized that the use of pesticides should be restricted in cotton fields located in zones adjacent to food crops. It was recommended that aerial application of persistent organochlorine pesticides and highly toxic organophosphorous pesticides should be banned within a radius of 300 m from bodies of water and 1000 m from settlements.

80-1528. Orphanidis, P. S.; Kapetanakis, E. G.; Petromichelaki, G. E. (Lab. Biol., Dep. Phytopharm., Inst. Phytopathol. Benaki, Athens, Greece) **Traitements des oliviers par une formulation de methoprene analogue de l'hormone juvenile des insectes, et leur efficacite sur le *Dacus oleae* (Gmel). [Sprayings of olive trees with a formulation of methoprene, a juvenile hormone analogue, and their effect on *Dacus oleae* (Gmel).]** *Meded. Fac. Landbouwwet. Rijksuniv. Gent* 43(2PT1): 541-551; 1978 (17 references) (French).

Olive trees were sprayed with methoprene, a juvenile hormone analog, during the years 1976 and 1977 to determine its effect on olive fruit fly *Dacus oleae* (Gmel). At methoprene concentrations between 0.015 and 0.120% AI, increasing dosage resulted in a reduction of eclosion rate of *Dacus* pupae, and a reduction in the number of normal adults.

80-1529. Axtell, R. C.; Dukes, J. C.; Edwards, T. D. (Dep. Entomol., North Carolina State Univ., Raleigh, NC 27650) **Field tests of diflubenzuron, methoprene, Flit MLO and chlorpyrifos for the control of *Aedes taeniorhynchus* larvae in diked dredged spoil areas.** *Mosq. News* 39(3): 520-527; 1979 (11 references).

Aedes taeniorhynchus larvae in temporary pools of water in depressions within diked dredge spoil disposal areas were readily controlled by application of the insect growth regulator diflubenzuron at a rate of 0.01 lb/acre (1.13×10^{-2} kg/ha) or higher. Difubenzuron was equally effective when applied as a wettable powder or a granular formulation. Complete mosquito control was achieved by use of the insect growth regulator methoprene at 0.04 lb/acre (4.52×10^{-2} kg/ha).

80-1530. Carroll, M. K. (New Orleans Mosq. Contr. Program, New Orleans, LA 70126) **Methoprene briquets as an attractant for gravid *Aedes aegypti* (L.).** *Mosq. News* 39(3): 680-681; 1979.

The use of methoprene encapsulated in charcoal briquets as an attractant for gravid *Aedes aegypti* (mosquito) was studied. Pairs of ovitraps (50) were placed throughout New Orleans in areas of high *A. aegypti* activity. One jar of each pair contained a miniket (miniaturized methoprene briquet), with the control containing no miniket. The jars were left in the field for 10 days, after which the eggs were identified and counted. The treated jars yielded a total of 929 *A. aegypti* eggs, and the untreated jars a total of 510 *A. aegypti* eggs, indicating that the miniket-treated jars were highly attractive to oviposition of *A. aegypti.*

80-1531. Anonymous **Dioxin and 2,4,5-T: what are the risks.** *Nature (London)* 284(5752): 111; 1980.

The EPA ban of the herbicide 2,4,5-T is discussed. The ban has been challenged by several groups, including the Dow Chemical Co., the principal manufacturer of the pesticide. Critics charge that the Oregon study, on which EPA has based its ban and which linked 2,4,5-T spraying to increases in spontaneous abortions, has serious flaws. The study is severely criticized on methodological grounds by many independent scientists, and at least 3 reports contrary to EPA's findings have been produced. More recently, the EPA has based its decision to ban the herbicide on the fact that the tetrachlorodibenzo-*p*-dioxin (dioxin) contaminant present in 2,4,5-T is a proven animal carcinogen. It is suggested that more data from industrial sources following accidental exposures, and medical records of workers handling and manufacturing 2,4,5-T be examined to provide evidence for or against the use of the herbicide.

80-1532. Peto, R. (Univ. Oxford, Oxford OX1 3BD, England) **Distorting the epidemiology of cancer: the need**

for a more balanced overview. *Nature (London)* 284(5754): 297-300; 1980 (20 references).

The extreme views of environmentalists and industrialists on cancer are discussed. A more dispassionate and disinterested approach is recommended for a realistic assessment of the risk to humans from contaminants such as pesticides and industrial chemicals in the environment. It is concluded that present-day cancer rates and trends are probably not dominanted by either occupational or environmental carcinogens or pollutants. The importance of identification and control of the small number of major factors influencing human cancer is emphasized. It is suggested that more benefits might be achieved by concentrating on other possible ways of improving longevity such as improving diets and smoking habits and counteracting malnutrition and infective and parasitic diseases.

80-1533. Wakatsuki, S. (Saku Gen. Hosp., Usuda, Nagano, Japan) **[Studies on the effects of agricultural chemicals on human body and the environment. A summarized report. Parts I & II. Studies on pesticide residues in humans and the environment and chronic effect on living animals.]** *Nippon Noson Igakkai Zasshi (J. Jpn. Assoc. Rural Med.)* 28(5): 691-696; 1980 (Japanese).

The results of several human and food residue studies and toxicity tests of fenitrothion and chlorpyrifos on experimental animals are reviewed. β-BHC and *p,p'*-DDE residues were determined in 48 samples of human milk, 22 kidney samples, 22 spleen samples, 23 liver samples, and 43 adipose tissue samples. Levels of β-BHC ranged from 0.033 ppm in spleen to 3.185 ppm in adipose samples and *p,p'*-DDE levels ranged from 0.044 ppm in spleen to 4.262 ppm in adipose tissues. Total BHC and total DDT were also determined in beef, pork, poultry and fish samples; the highest residues found were 93.2 ppb BHC in beef and 58 ppb DDT in fish. Mercury residues in 401 human hair samples ranged from 0.1 to 18 ppm; mercury residues in rice from the same region were 0.005-0.013 ppm. Beagle dogs and rhesus monkeys were given fenitrothion for 48 wk; serum cholinesterase (ChE) was depressed in beagles and chronic intestinal disturbances were noted in monkeys. Chlorpyrifos was orally administered to rats at 5-300 mg/kg and residues in body fat were present up to 40 days later. In monkeys chlorpyrifos caused abnormal EEGs and inhibition of serum ChE.

80-1534. Cooke, B. K.; Pappas, A. C.; Jordan, V. W. L.; Western, N. M. (Long Ashton Res. Stn., Univ. Bristol, Bristol BS18 9AF, England) **Translocation of benomyl, prochloraz and procymidone in relation to control of *Botrytis cinerea* in strawberries.** *Pestic. Sci.* 10(6): 467-472; 1979 (9 references).

Benomyl, prochloraz or procymidone, applied as an overall plant spray at the open-flower stage, effectively suppressed *Botrytis cinerea* fruit rot, whereas no control was achieved by foliar application only. Fruit rot was prevented using procymidone applied to the soil 12 days before inoculation of the flowers, whereas benomyl or prochloraz gave little or no control, respectively, when applied in the same manner. Bioassays, using *Penicillium expansum* on leaf and flower extracts of strawberry plants growing in soil treated with procymidone, showed the presence of an inhibitory compound with the same R_f value on thin-layer chromatography as that of procymidone. Analysis by gas chromatography and identification by gas chromatography mass spectrometry established that the fungicide procymidone was translocated from the root system of strawberry plants to the leaves and flowers. (Author abstract by permission)

80-1535. Welling, W. (Lab. Res. Insecticides, NL-6709 PG Wageningen, The Netherlands) **Toxicodynamics of insecticidal action: an introduction.** *Pestic. Sci.* 10(6): 540-546; 1979 (35 references).

As an introduction to insecticide toxicodynamics, a description is given of the elementary processes with their interactions that are essential to an understanding of the dynamic behavior; these include penetration, binding, biochemical conversions and reaction with the target. Points of ignorance or controversy are emphasised. A method is discussed for integrating existing knowledge quantitatively by using mathematical models. (Author abstract by permission)

80-1536. Riov, J.; Goren, R. (Dep. Horticult., Hebrew Univ. Jerusalem, Rohovot, Israel) **Inhibition of polar indole-3-acetic acid transport by cycloheximide.** *Plant Physiol.* 63(6): 1217-1219; 1979 (21 references).

The midrib tissues of mature leaves of citrus (*Citrus sinensis*) and poplar (*Populus deltoides*) were used in studies designed to test the effects of cycloheximide (CH) on indole acetic acid (IAA) transport. Midrib tissue sections were placed in holders with the basal ends resting on receiving cylindrical blocks containing the desired concentration of CH, with agar blocks containing (2-^{14}C)IAA applied to the apical ends. Sections were allowed to transport IAA for 4 hr in the dark at 25°C, then cut into segments. All segments and receiver blocks were extracted and counted in a liquid scintillation spectrometer. In addition, respiration of control and CH-treated midrib sections following 4 hr auxin transport was measured with a Gilson proportional respirometer. Basipetal IAA transport in leaf midrib sections was significantly reduced by CH, as indicated by the reduction in radioactivity recovered in the receiver agar cylinders. The effect was more pronounced in poplar, where a concentration as low as 1 μM reduced the radioactivity in the receiver cylinders by 43%. Radioactivity decreased in the basal section, and increased in the middle segments, indicating that auxin transport has been altered within the sections. Experiments in which midrib

sections were soaked in CH prior to the determination of auxin transport indicated accumulation of radioactivity in the apical segment and inhibition of IAA transport in the middle segments. It is suggested that the mechanism of auxin transport inhibition by cycloheximide consists of arresting protein synthesis and not the disruption of energy flow. Either a carrier protein or auxin-induced proton excretion in auxin transport is likely to be involved.

80-1537. Bullock, R. C.; McCory, C. W. (Agric. Res. Cent., Univ. Florida, Ft. Pierce, FL 33450) **Activity of insect growth regulators versus citrus rust mite in Florida.** *Proc. Fla. State Hortic. Soc.* 91: 72-74; 1978 (12 references).

During 1976 and 1978 aerial sprays of the insect growth regulators hexadecyl cyclopropanecarboxylate (Zardex; cycloprate) and diflubenzuron (Dimilin) were applied by fixed wing and rotor aircraft to citrus groves in Polk and St. Lucie counties, Florida. All treatments were applied at 10 gal finished spray/acre (93.5 ℓ/ha). Both Zardex and Dimilin showed promise for control of citrus rust mite, but neither provided the high initial kill displayed by currently recommended miticides. Due to the compatibility of these compounds with several agricultural chemicals, their use in the future is expected to increase.

80-1538. Spalding, D. H.; King, J. R.; Benschoter, C. A.; von Windeguth, D. L.; Reeder, W. F.; Burditt, A. K., Jr. (Subtrop. Hortic. Res. Stn., Agric. Res., SEA, USDA, Miami, FL 33158) **Ethylene dibromide, methyl bromide and phosphine fumigation of tomatoes.** *Proc. Fla. State Hortic. Soc.* 91: 156-158; 1978 (6 references).

Freshly picked, mature green tomatoes of the Walter and Flora-dade variety that had been waxed commercially were fumigated with ethylene dibromide at 8 g/m³ for 2 hr at 21°C. This treatment was found to injure the skin of the tomatoes. Fumigation with methylene bromide at 32 g/m³ for 3.5 hr at 21°C caused no injury. Phosphine (aluminum phosphide) can also be successful at 250 and 350 ppm for Flora-Dade and Walter tomatoes, respectively, with no damage. Severe injury and increased decay of Flora-Dade tomatoes was caused by fumigation with phosphine at 1700 ppm for 4 days and temperatures of 24°C.

80-1539. Merrell, R.; Wagstaff, K. (Utah Mosq. Abatement Assoc., Provo, UT) **Status of organophosphorous mosquito larvicide resistance in Utah: 1977.** *Proc. Utah Mosq. Abatement Assoc.:* pp. 10-12; 1978 (2 references).

Results are reported of 1977 studies on the organophosphate resistance of Utah mosquitos. Parathion, fenthion, malathion, and temephos were tested, using a previously described method. Results indicating high or borderline resistance are reported in tabular form; the location of treatment, the LC50 and the LC90 to LC50 ratio are given. Resistant populations of *Aedes dorsalis, Aedes vexans, Aedes nigromaculis* and *Culex pipiens* were found in several countries. Juvenile hormones and analogs are suggested for use since cross-resistance was observed.

80-1540. Kearney, P. C.; Amundson, M. E.; Beynon, K. I.; Drescher, N.; Marco, G. J.; Miyamoto, J.; Murphy, J. R.; Oliver, J. E. (BARC-West, Beltsville, MD 20705) **Nitrosamines and pesticides - a special report on the occurrence of nitrosamines as terminal residues resulting from agricultural use of certain pesticides.** *Pure Appl. Chem.* 52(2): 501-526; 1980 (158 references).

Nitrosamines associated with pesticides are reviewed. The chemistry of these chemicals is presented, with emphasis on their properties and preparation. Methods for determining the presence of nitrosamines are discussed including gas chromatography, thermal energy analyzers, thin-layer chromatography, high pressure liquid chromatography, and a liquid chromatographic method. The manufacturing and formulation of pesticides containing nitrosamines as contaminants is reviewed. Emphasis is also placed on the formation of nitrosamines in the environment including formation in soil, air, water, plants and animals. Degradation and metabolism of nitrosamines in each of these systems is discussed. Details of risk assessment are presented.

80-1541. Styczynska, B. (Dep. Toxicol. & Public Health, Warsaw, Poland) **Bioanalogi hormonow owadzich jako nove insektycydy III generaciji. [Bioanalogues of insect hormones as new third generation insecticides.]** *Rocz. Panstw. Zakl. Hig.* 30(2): 167-178; 1979 (20 references) (Polish).

The insects *Tenebrio moliter, Pyrrhocoris apterus, Musca domesticus,* and *Blattella germanica* were used to test the effectiveness of 36 juvenile hormone analogs. JHA129, JHA132, JHA140, JHA147 and JHA148 were tested in detail. JHA147 and JHA148 are cyclopropyl compounds, derivatives of 2,3-methylenefarnesic acid and 2,3-methylenefarnesol. Tests indicated that, after treatment of larvae with the analogs, the pupation process was not affected but the numbers of adult insects leaving the pupae were reduced. Pupae treated with 0.1 μg/insect produced no adult flies. Treatment with JHA147 or JHA148 resulted in a fourfold reduction in the number of offspring reaching adult stages, while Altosid treatment produced a sevenfold reduction. In addition, JHA147 and 148 significantly reduced the fertility of female flies, and histological examinations showed that ovarian changes included vacuolization of nutrient cells and oocytes, condensation of chromatin in the nuclei of nutritive cells, and changes in the follicular epithelium.

80-1542. Kozak, V. P.; Simsiman, G. V.; Chesters, G. Y.; Stensby, D.; Harkin, K. (Wisconsin Univ., Madison, WI) **Reviews of the environmental effects of pollutants: XI. Chlorophenols.** *US EPA Rep.* EPA-600/1-79-012: 519 pp.; 1979 (248 references).

This study reviews the health and environmental effects of chlorophenols. It includes discussions of physical and chemical properties; analytical methods; biological aspects in microorganisms, plants, animals, and humans; environmental distribution and transformation; and environmental interactions and their consequences. All of the economically or environmentally important chlorophenol isomers are reviewed: 2-chlorophenol, 2,4-dichlorophenol, 2,4,5-trichlorophenol, 2,4,6-trichlorophenol, tetrachlorophenols, and pentachlorophenol (PCP). PCP is the most toxic of the isomers. Fish kills, extensive losses of wildlife, toxic effects in domestic animals, and human fatalities have resulted from exposure to PCP. Available evidence indicates that moderate bioconcentration and biomagnification of PCP may occur in aquatic organisms. The primary source of human exposure to chlorophenols (except PCP) is likely to be the degradation of chemically related phenoxyalkanoic herbicides such as 2,4-D and 2,4,5-T. Use of PCP as a wood preservative is the major source of human exposure. PCP is ubiquitous in the environment. Low, but detectable levels have been found in river water, municipal water supplies, human foodstuffs and in the blood, urine, and fat of nonoccupationally exposed humans. Monitoring data on the other chlorophenol isomers are not available. Chronic toxicity of chlorophenols to humans has not been documented. Available data indicate that chlorophenols do not possess tumorigenic, mutagenic, or teratogenic properties. Several isomers may be embryotoxic. 2-Chlorophenol, 2,4-dichlorophenol, and 2,4,5-trichlorophenol may promote tumors in mice. Available data fail to suggest a direct carcinogenic potential of any of the isomers reviewed. (Author abstract by permission, abridged)

80-1543. Reichelderfer, K. H. (Nat. Res. Econ. Div., Econ. Stat. & Coop. Serv., USDA, Washington, DC 20250) **Economic feasibility of a biological control technology: using a parasitic wasp, *Pediobius foveolatus*, to manage Mexican bean beetle on soybeans.** *US NTIS PB Rep.* PB-300,627: 25 pp.; 1979 (9 references).

Biological and conventional control can yield similar economic returns to pest control expenditures. Finding is based on economic feasibility study of using the parasitic wasp, *Pediobius foveolatus*, in place of conventional insecticides to control Mexican bean beetle on soybeans. Insect scouting in conjunction with use of the parasite is also compared with conventional control. Widespread use of the parasite to control the beetle could reduce use of insecticides without compromising soybean producers' revenues. (Author abstract by permission)

80-1544. Crockett, P. W. (Author address not given) **Toxicity of pesticides. Volume 2. October, 1976-August, 1978. (A bibliography with abstracts).** *US NTIS PS Rep.* PS-79,0975: 396 pp.; 1979 (338 references).

Research reports on the toxic effects of pesticides on non-target organisms are cited. Studies are included on the biological effects on humans, wildlife, and aquatic life through direct exposure, food chains or degradation products. This updated bibliography contains 388 abstracts. (Author abstract by permission)

80-1545. Harrison, E. A. (Author address not given) **Toxicity of pesticides. Volume 3. September, 1978-September, 1979. (A bibliography with abstracts).** *US NTIS PS Rep.* PS-79,0976: 122 pp.; 1979 (113 references).

Research reports on the toxic effects of pesticides on non-target organisms are cited. Studies are included on the biological effects on humans, wildlife, and aquatic life through direct exposure, food chains, or degradation products. This updated bibliography contains 113 abstracts. Items not previously published will be included in this issue of *Pesticides Abstracts.* (Author abstract by permission)

80-1546. Vanhooidonk, C. (Prins Maurits Lab., TNO, Rijswijk, The Netherlands) **Percutaneous absorption of toxic agents. Part 2. The nerve bases and some other toxic organophosphates. A survey of the literature.** *US NTIS PS Rep.* PS-79,0976: p. 20; 1979.

Quantitative data on the penetration rates of nerve gases and some other toxic organophosphates (pesticides) are collected from the open literature. An introduction is given on the properties of the skin and the percutaneous absorption of compounds in general. A survey was made of the open literature on the above compounds. (Author abstract by permission)

80-1547. Cavagnaro, D. M. (Author address not given) **DDT, DDD, and DDE pesticides. Volume 2, 1977-August, 1979. (A bibliography with abstracts).** *US NTIS PS Rep.* PS-79,1029: 179 pp.; 1979 (172 references).

The cited reports over pollution, biodegradation, ecological effects, uses, and accumulation in plants and animals of DDD (TDE), DDE, and DDT insecticides. This updated bibliography contains 172 abstracts. Items not previously published will be included in this issue of *Pesticides Abstracts.* (Author abstract by permission)

80-1548. Risebrough, R. W. (Univ. California, Berkeley, CA) **Pollutants in marine mammals; a literature review and recommendations for research.** *US NTIS PS Rep.* PS-79,1029: p. 4; 1979.

A review of the published literature and of selected unpublished data on the distributions and concentrations of pollutants in marine mammals has shown that all marine mammal populations are now exposed to a certain level of anthropogenic chemicals. Relationships, however, between

observed pollutants levels and documented effects have remained difficult to prove. The pollutants include petroleum and petroleum-derived compounds, radioactive isotopes, certain trace elements and heavy metals, and synthetic organic compounds, particularly chlorinated hydrocarbons. The present data base is inadequate to show whether those petroleum compounds that may be present in seawater and filter-feeding organisms are sufficiently persistent to accumulate in accumulate in marine mammal tissues. Mortality of individuals of those species which depend on their pelage for thermoregulation can be expected to occur in the event of oil spills. (Author abstract by permission)

80-1549. Gur, A.; Gil, Y.; Bravdo, B. (Dep. Hortic., Fac. Agric., Hebrew Univ. Jerusalem, Rehovot, Israel) **The efficacy of several herbicides in the vineyard and their toxicity to grapevines.** *Weed Res.* 19(2): 109-116; 1979 (29 references).

Application of several herbicides and a combination of herbicides in 2 vineyards resulted in a perfect control of Bermuda grass by glyphosate and mixed or alternate applications of MSMA and dalapon. Johnson grass was eliminated by MSMA with and without the addition of dalapon. Dalapon combined with MSMA reduced the yield of the grapevines and their growth, as measured by the weight of pruning. Yields were also significantly reduced by aminotriazole (amitrole) and in 1 vineyard also by simazine. Reduced vegetative growth was caused by MSMA and glyphosphate. MSMA and glyphosphate reduced the chlorophyll content of the grape leaves and the reducing sugar content of the canes in water. Aminotriazole reduced the reducing sugar content of both leaves and canes and the nitrogen content of the canes. In 1 vineyard simazine reduced the chlorophyll content of the leaves and increased the nitrogen content of the canes. MSMA alone and in combination with dalapon increased the arsenic content of leaves, canes and fruits of grapevines. Arsenic levels were the highest in the canes, but still did not exceed 0.6 ppm. Levels were lowest in fruits and did not exceed 0.1 ppm. Dalapon reduced the chlorophyll content of leaves in June and increased it in July. It also affected the reducing sugar content of leaves and canes without affecting yields or growth. (Author abstract by permission)

80-1550. Ogg, A. G., Jr.; Drake, S. (Irrig. Agric. Res. & Ext. Cent., Agric. Res., SEA, USDA, Prosser, WA 99350) **Effects of herbicides on weeds and sweetcorn (*Zea mays*) grown on coarse-textured soils.** *Weed Sci.* 27(6): 608-611; 1979 (7 references).

Alachlor [2-chloro-2′,6′-diethyl-*N*-(methoxymethyl)acetanilide] at 3.4 kg/ha, EPTC (*S*-ethyl dipropylthiocarbamate) + R-25788 (*N,N*-diallyl-2,2-dichloroacetamide) at 4.5 + 0.4 and 9.0 + 0.8 kg/ha, vernolate (*S*-propyl dipropylthiocarbamate) + R-25788 at 4.5 + 0.4 and 9.0 + 0.8 kg/ha, metolachlor [2-chloro-*N*-(2-ethyl-6-methylphenyl)-*N*-(2-methoxy-1-methylethyl)acetamide] at 1.7 and 3.4 kg/ha, and metolachlor + procyazine {2-[[4-chloro-6-(cyclopropylamino) 1,3,5-triazine-2-yl]amino]-2-methylpropanenitrile} at 1.3 + 1.3 kg/ha were preplant incorporated. These herbicides controlled 95% or more of the barnyardgrass [*Echinochloa crus-galli* (L.) Beauv.], common lambsquarters (*Chenopodium album* L.), redroot pigweed (*Amaranthys retroflexus* L.), Powell amaranth (*A. powell* S. Wats.), and yellow foxtail [*Setaria lutescens* (Weigel) Hubb.] without injuring sweetcorn (*Zea mays* L. Golden Jubilee) or reducing corn yields or quality. Similar results were obtained with preplant incorporated applications of butylate (*S*-ethyldiisobutylthiocarbamate + R-25788 at 4.5 + 0.2 kg/ha followed by a postemergence application of the amine salt of 2,4-D [(2,4-dichlorophenoxy)acetic acid] at 0.6 kg/ha. Metribuzin [4-amino-6-*tert*-butyl-3-(methylthio)-*as*-triazin-5(4*H*)-one] at 0.3 and 0.6 kg/ha and metribuzin + alachlor at 0.6 + 2.2 kg/ha applied preplant and incorporated reduced corn stands, primary ear production, and corn yields significantly. None of the herbicides significantly affected total sugars, reducing sugars, soluble solids, moisture content, or succulence of the corn. (Author abstract by permission)

80-1551. Elstner, E. F.; Osswald, W. (Inst. Bot. & Mikrobiol., Tech. Univ. Muenchen, D-8000 Munich 2, BRD) **Chlorophyll photobleaching and ethane production in dichlorophenyldimethylurea (DCMU) or paraquat-treated *Euglena gracilis* cells.** *Z. Naturforsch. Teil C* 35(1-2): 129-135; 1980 (33 references).

Correlations between chlorophyll breakdown and lipid peroxidation after herbicide treatment were investigated. Cell-free homogenates of *Euglena gracilis* were illuminated at 35 K lux for 4 hr in slightly acid (pH 6.5-5.4) environments and were exposed to 2×10^{-5} *M* DCMU (diuron) or 10^{-3} *M* paraquat. Chlorophyll bleaching by light and ethane formation were enhanced 3-fold by DCMU and 4-fold by paraquat. Chlorophyll photobleaching was accompanied by the formation of malondialdehyde (a thiobarbituric acid-sensitive material). Both of these effects were partially prevented by 10^{-4} *M* concentrations of the autooxidizable photosystem II electron acceptor dibromo thymoquinone (DBMIB) or by 25 m*M* concentrations of $NaHCO_3$. Two possible mechanisms for the connection between chlorophyll bleaching and fatty acid oxidation include photooxidation in photosystem II caused by e^- transport blockers, like DCMU, and formation of oxygen radicals after autooxidation of e^- acceptors of photosystem I by paraquat.

80-1552. Mahn, E. G.; Helmecke, K. (Dep. Geobot., Sect. Biol. Sci., Martin-Luther Univ., Halle-Wittenberg, DDR) **Effects of herbicide treatment on the structure and functioning of agro-ecosystems. II. Structural changes in the plant community after the application of herbicides over several years.** *Agro-ecosystems* 5(2): 159-179; 1979 (33 references).

The herbicides 2,4-D (1.5 or 3.0 kg/ha), simazine (4 and 8 kg/ha), or MCPA (1.5 or 3 kg/ha) were applied to crop fields for 5 consecutive yr to test the effects of the herbicides on the biomass and species diversity of weed and cultivated cereal plants. The application of the herbicides led to quantitative changes in the structure, biomass and numbers of individuals of weed populations. In contrast, the number of weed species remained almost constant throughout the test period. The application of the herbicides did not cause significant increases in the biomass and yield of the crop species right away. There are tendencies toward greater increases in biomass and grain yield of the cereal plants after 3-5 yr. The phenoxy acids degraded rapidly each yr. Simazine caused enduring changes on several components of the ecosystem.

80-1553. Cserhati, T.; Vegh, A.; Kecskes, M. (Plant Prot. Res. Inst., Budapest, Hungary) **Kulonbozo sterilizesi eljarasok hatasa a linuron adszorpciojara nehany talajtipusban. [Effect of different ways of sterilization on adsorption of linuron in some soil types.]** *Agrochem. Talajtan* 27(1-2): 162-168; 1978 (7 references) (Hungarian).

Sterilization with formaldehyde, radiation, heat, or by autoclaving was found to increase the linuron adsorption capacity of brown forest soil (Ramann type) and peat soil. Decreases in the time needed to reach the adsorption equilibrium were occasionally observed after sterilization. It is suggested that changes in the humus content and structure following different methods of sterilization explain the altered soil response to the herbicide. No linear correlation was found between the adsorption capacities of the soils and increases in UV extinction values of water extracts characterizing changes in the humus structure.

80-1554. Kolesnikov, V. A.; Sidorov, V. I. (Res. Inst. Veg. Growing, Mytishchi, Moscow, USSR) **Pitatel'nyi rezhim i biologicheskaya aktivnost' pochvy pri dlitel'nom primenenii gerbitsidov. [The nutrient regime and biological activity of soil with the long-term continual use of herbicides.]** *Agrokhimiya* (3): 124-129; 1978 (7 references) (Russian).

An attempt was made to evaluate the effect of prolonged application of herbicides on the level of nitrate nitrogen, mobile phosphorus and exchange potassium, as well as on the total biological activity of the soil. The experiments were performed in a vegetable-fodder crop rotation (potato, carrot, cabbage), on a soddy-podzolic medium loamy soil. Herbicides (prometryne at 2.0 kg/ha, linuron at 2.0 kg/ha, and semeron (desmetryne) at 0.7 kg/ha) were applied for 3 yr. Application of herbicides, in doses which provided 89-96% weed control, increased the yields of potato and carrot by 30% and 27.5-39.6%, respectively, but did not affect cabbage yield. Herbicide applications increased the levels of nitrates in the soil. Nitrate accumulation in the top (0-10 cm) layer of the soil was greater than the 10-20 cm layer. The herbicides also increased the overall biological activity of the soil as measured by the intensity of respiration.

80-1555. Ovchinnikova, M. F.; Orlov, D. S. (Agrobiostn., Moscow State Univ., Moscow, USSR) **Izmenenie biologicheskoi aktivnosti i nekotorykh drugikh svoistv dernovopodzolistoi pochvy v sviazi s primeneniem triazinovykh gerbitsidov. [Changes of biological activity and some properties of soddy-podzolic soil due to the use of triazine herbicides.** *Agrokhimiya* (1): 109-118; 1980 (24 references) (Russian).

The results of a 4-yr study of seasonal variation of some parameters of biological activity of soddy-podzolic soil after application of the triazine herbicides simazine and prometryne (2.5 kg/ha) are reported. According to the degree of seasonal variability, major parameters of biological activity of the soil could be divided into three groups: the most variable parameters (coefficient of variation 40-70%) were intensity of respiration and temperature of the top layer of the soil, the mildly variable parameters (10-30%) were field moisture content of the soil, and the level of humic and fulvic acids, while the most stable parameters (coefficient of variation 1-10%) were the levels or organic carbon, total nitrogen and carbohydrates. Application of herbicides induced the greatest changes in the intensity of respiration. Prometryne resulted in inhibition of respiration shortly after application, while the inhibitory effect of simazine increased with the duration of contact with soil and reached maximum 100 days after application. Prolonged application of simazine resulted in accumulation of organic substances.

80-1556. Gangwar, S. K.; Kavadia, V. S.; Gupta, H. C. L.; Srivastava, B. P. (Pestic. Residue Lab., Dep. Entomol., Rajasthan Coll. Agric., Univ. Udaipur, Udaipur, India) **Persistence of carbaryl in sandy loam soil and its uptake in bajra, *Pennisetum typhoides* P.** *Ann. Arid Zone* 17(4): 357-362; 1979 (12 references).

Plots of sandy loam soil were treated with the insecticide carbaryl (4% granules) applied in furrows at rates of 20, 40 and 60 kg AI/ha. Each treatment dose was replicated three times every year from 1972 through 1974. Much of the carbaryl was lost from sandy loam soil within 15-30 days after application. In 90 days the reduction reached 94-100%. At all stages of growth there was no detectable residues of carbaryl in bajra plants. Similarly, the grain did not show insecticide residues.

80-1557. Munnecke, D. E.; Van Gundy, S. D. (Dep. Plant Pathol., Univ. California, Riverside, CA 92521) **Movement of fumigants in soil, dosage responses, and differential effects.** *Annu. Rev. Phytopathol.* 17: 405-429; 1979 (79 references).

Recent research on the use and activity of soil fumigant pesticides is reviewed. The activities of soil fumigants are influenced by the chemical properties of the compounds (vapor pressure, solubility and atmospheric diffusion rates), soil temperature, soil moisture, soil texture and composition and biological factors. Microbial transformation and degradation of soil fumigants are described. Biodehalogenation of 1,3-D, EDB (ethylene dibromide), and DBCP (dibromochloropropane) and how the organic matter content of the soil affects the activity of pesticidal fumigants are noted. Fumigant movement in disturbed versus undisturbed soils and the effects of using covers or seals after fumigant application on fumigant movement in soils are also reviewed.

80-1558. Fuchs, A.; de Vries, F. W. (Lab. Phytopathol., Agric. Univ., Wageningen, The Netherlands) **Bacterial breakdown of benomyl. II. Mixed cultures.** *Antonie van Leeuwenhoek J. Microbiol. Serol.* 44(3-4): 293-311; 1979 (37 references).

Evidence for cleavage of the benzimidazole heterocyclic ring was obtained with mixed bacterial cultures grown in liquid media containing the fungicide benomyl, with or without sodium lactate as the carbon source. However, when 2-aminobenzimidazole or benzimidazole were used as the sole source of carbon, neither supported any bacterial growth. In experiments designed to measure total ^{14}C balance, production of carbon dioxide was shown from methyl benzimidazol-2-yl carbamate, thus confirming cleavage of the benzimidazole nucleus. In bioassays it is noted, however, that the actual rate of benomyl and MBC breakdown is small; recovery of the parent compound is substantial up to 80 days of incubation. It is suggested that cleavage of the benzimidazole ring is probably a matter of cometabolism with *n*-butylamine originating from the butylcarbamoyl side chain and serving as the source of carbon.

80-1559. Barker, R. J.; Lehner, Y.; Kunzmann, M. R. (Carl T. Hayden Bee Res. Cent., USDA, Tucson, AZ 85719) **Pesticides and honey bees: nectar and pollen contamination in alfalfa treated with dimethoate.** *Arch. Environ. Contam. Toxicol.* 9(1): 125-133; 1980 (14 references).

Medicago sativa L. (Leguminosae) sprayed with *O,O*-dimethyl *S*-(*N*-methylcarbamoylmethyl) phosphorodithioate (dimethoate) had only 0.5 ppm of dimethoate in pollen one day later, but 3 ppm in nectar one wk later, and 1 ppm in nectar two wk later. As little as 1 ppm added to syrup fed to caged workers of *Apis mellifera* L. (Apidae) inhibited cholinesterase and reduced survival. Bees given a choice between treated and untreated syrups showed no preference; this suggests that the levels of dimethoate found in nectar are toxic and not repellent. (Author abstract by permission)

80-1560. Ware, G. W.; Crosby, D. G.; Giles, J. W. (Dep. Entomol., Univ. Arizona, Tucson, AZ 85721) **Photodecomposition of DDA.** *Arch. Environ. Contam. Toxicol.* 9(2): 135-146; 1980 (31 references).

The photodecomposition of aqueous solutions of 2,2-bis-(*p*-chlorophenyl)-acetic acid (DDA) was slow in sunlight and rapid in the laboratory, producing *p,p'*-dichlorobenzophenone (DCB), *p*-chlorobenzadehyde, *p*-chlorophenol, and several unidentified polar products. *p,p'*-Dichlorobenzilic acid, and *p,p'*-dichlorobenzhydrol gave rise to the same photoproducts, while bis-(*p*-chlorophenyl) methane (DDM) and chlorobenzilate were converted only to DCB. DCB and *p*-chlorobenzaldehyde proved to be resistant to photodegradation but gradually produced *p*-chlorobenzoic acid which, in turn, formed *p*-hydroxybenzoic and benzoic acids, probably the last environmentally detectable links in the long chain of DDT degradation to CO_2 and water. High pressure liquid chromatography (HPLC) proved to be ideal for separating and quantitating the parent compounds and their photoproducts directly from the aqueous photolysates or from methanol solutions of the isolates and standards. (Author abstract by permission)

80-1561. Knaak, J. B.; Jackson, T.; Fredrickson, A. S.; Rivera, L.; Maddy, K. T.; Akesson, N. B. (California Dep. Food & Agric., Sacramento, CA 95814) **Safety effectiveness of closed-transfer, mixing-loading, and application equipment in preventing exposure to pesticides.** *Arch. Environ. Contam. Toxicol.* 9(2): 231-245; 1980 (10 references).

Blood cholinesterase (CHE) activities and urinary dialkyl phosphate levels of 5 mixer-loaders and 4 mixer-loader applicators, using a closed-transfer system in conjunction with mixing-loading and application equipment, were monitored over a period of 18 wk. Airborne pesticide residues in the breathing zone during mixing-loading and the transfer of concentrated liquid pesticide from their original container to mix and spray tanks were determined along with airborne residues during ground application. Blood ChE activities of the majority of the workers increased slightly during the study with increased use of toxic organophosphates and carbamates. Urinary dialkyl phosphate levels varied between 0.02 and 2.4 ppm. During the study, the blood ChE activities of 2 mixer-loaders decreased and dialkyl phosphate levels of 2.4 ppm were found in the urine of 1 worker. An investigation indicated that the workers had failed to use the provided closed-transfer system. Airborne residues from liquid pesticides

during closed transfer and mixing-loading averaged 5.8 $\mu g/m^3$, while residues from dusty powders averaged 152 $\mu g/m^3$. Airborne residues during ground application averaged 3.7 $\mu g/m^3$ during the workday. Mevinphos residues on cloth patches averaged 0.2 $\mu g/cm^2$. (Author abstract by permission)

80-1562. Korte, F.; Klein, W.; Scheunert, I. (Inst. Oekol. Chem., Ges. Strahlen & Umveltforsch. mbH Muenchen, Nuehrenberg, DDR) **Occurrence and fate of chemicals in the environment with special reference to pesticides.** *Ber. Kernforschungsanlage Juelich* 1534: 7-38; 1978 (9 references).

The world-wide production of, presence in the environment, and persistence of environmental chemicals, including pesticides, are reviewed. The conversion of pesticides to their degradation products under abiotic and biotic conditions are also discussed. Abiotic reactions of organochlorine pesticides (dieldrin, endrin, DDT, and PCP) in the environment are mainly photoisomerization or photodechlorination. Most environmental chemicals, including pesticides, are partially metabolized by plants, animals, and humans. The degradation pathways are mainly by means of hydroxylation, conjugation, or other redox reactions which render these chemicals more water soluble. Accumulation of pesticide residues in the environment via the food chain has been an especially important problem. It is suggested that in a closed ecosystem with limited resources and limited degradation capacities, the limits of pollutant output should be determined.

80-1563. Fuehr, F. (Author address not given) **Impact of environmental factors on uptake and metabolism of pesticides.** *Ber. Kernforschungsanlage Juelich* 1534: 39; 1978.

Various environmental factors which play a part in determining how much pesticide will be taken up by a given plant are discussed. Among these factors are included photodegradation of the compound, chemical and microbial degradation, water content of the soil, leaching and transport of the compound, adsorption and desorption, temperature, humidity and rainfall. When conducting plant experiments, it is extremely difficult to determine the exact extent to which any of the above mentioned factors may affect the outcome.

80-1564. Cairns, T.; Parfitt, C. H. (US FDA, San Francisco, CA 94102) **Persistence and metabolism of TDE in California Clear Lake fish.** *Bull. Environ. Contam. Toxicol.* 24(4): 504-510; 1980 (6 references).

Data is presented on the persistence and metabolism of TDE in 12 fish collected in 1967 from Clear Lake in California. Clear Lake, a naturally occurring shallow lake, was treated with TDE in 1949, 1954, and 1957 (a total of over 5.4 × 74 kg of TDE) to control gnats. Composits were prepared from the edible portion of the fish, including the skin. Head, tail, bones, scales and viscera were discarded. Samples were extracted, then examined by electron capture gas chromatography. The presence of the parent compound was clearly demonstrated. One European carp sample contained 6.0 ppm *p,p'*-TDE and 2.06 ppm *o,p'*-TDE. The TDE metabolites DDMS, DDNU, and DDNS were also found in some samples. It is concluded that the high levels of TDE found in carp samples are further evidence that bottom feeding species suffer greater exposure to TDE because of high sediment concentration of the pesticide.

80-1565. Still, C. C.; Hsu, T. S.; Bartha, R. (Dep. Biochem. & Microbiol., Cook Coll., Rutgers Univ., New Brunswick, NJ 08903) **Soil-bound 3,4-dichloroaniline: source of contamination in rice grain.** *Bull. Environ. Contam. Toxicol.* 24(4): 550-554; 1980 (11 references).

Rice plants at the 4 leaf stage were selected and transplanted to soil/sand mixtures. At the end of a 16 wk period of pretreatment with a nutrient solution, the soil of selected plants was treated with ^{14}C labeled 3,4-dichloroaniline (DCA) at a final concentration of 16.6 mg/ml. For foliar treatment DCA was applied at a final concentration of 138.75 mg/ml. Leaf treatment and soil treatment resulted in about the same amount of radioactivity in the plant. No significant radioactivity was later detected in grains of the leaf-treated rice plants, although the shoots of these contained more radioactivity than did the shoots of the soil-treated plants. It is suggested that DCA found in present rice grain samples was temporarily immobilized in soil as humic complex and was thus made available for root uptake during the grain ripening period by the microbial cleavage of these humic complexes.

80-1566. Staiff, D. C.; Davis, J. E.; Butler, L. C. (Health Eff. Res. Lab., Wenatchee Pestic. Res. Branch, US EPA Wenatchee, WA 98801) **Gastric availability of a liquid concentrate formulation of paraquat dichloride following simulated spillage on soil.** *Bull. Environ. Contam. Toxicol.* 24(4): 555-561; 1980 (12 references).

Four different soils types were contaminated by simulated spills of a liquid concentrate formulation of paraquat dichloride. Gastric availability was studied as a function of time, thus allowing the toxic potential of spills of concentrated paraquat dichloride to be measured, with special consideration given to small children who may ingest contaminated soil. The paraquat dichloride was strongly adsorbed onto the soil. However, in cases of spills, the adsorption sites in the soil are quickly saturated, leaving high levels of chemical available. The amount of paraquat available ranged from 16,900 ppm in sandy soil to 23,600 ppm in high clay content soils. After a 2 yr period

the available amount in the sandy soil dropped to 410 and in the high clay soil to 1250.

80-1567. Wright, C. G.; Leidy, R. B. (Dep. Entomol., North Carolina State Univ., Raleigh, NC 27650) **Insecticide residues in the air of buildings and pest control vehicles.** *Bull. Environ. Contam. Toxicol.* 24(4): 582-589; 1980 (9 references).

Insecticide levels present in the air of commercial pest control buildings, service vehicles and food preparation-serving areas following routine commercial insecticide application were determined. Air samples were collected in these structures using personal type air samplers. A total of 6 pesticide storage rooms and office rooms, 6 food preparation areas treated with chlorpyrifos, and 6 sedans, 6 vans, and 9 pickups used by pest control technicians were sampled. The samples were analyzed for the insecticides known to be present in the structure being tested. The insecticides chlorpyrifos, diazinon, malathion and DDVP (dichlorvos) were found in the storage rooms, with DDVP being at the highest level (average 617 ng/m^3 air). The office rooms contained significantly less insecticide than the storage rooms. In food preparation-serving areas, significantly higher residues of chlorpyrifos were present in the ambient air immediately after application than 24 hr later. Air flow, rather than amount of insecticide applied or method of application, appears to influence the amount of chlorpyrifos present. Chlorpyrifos, diazinon, malathion and DDVP residues were present in some of the vehicles tested, and were apparently related to presence of the sprayer in the cab or to accidental spills. All insecticide levels in the buildings and vehicles were far below the allowable limits.

80-1568. Peoples, S. A.; Maddy, K. T.; Cusick, W.; Jackson, T.; Cooper, C.; Frederickson, A. S. (California Dep. Food & Agric., Sacramento, CA) **A study of samples of well water collected from selected areas in California to determine the presence of DBCP and certain other pesticide residues.** *Bull. Environ. Contam. Toxicol.* 24(4): 611-618; 1980.

A study was designed to test for the presence of DBCP (dibromochloropropane) in water wells located in agricultural areas of California where the pesticide has been used. Sampling was carried out in 1979, and in all areas except one no known DBCP applications has been made for at least 2 yr. A total of 262 wells were sampled, and DBCP was determined by gas chromatography/mass spectrometry. Several other pesticides, including organochlorines, were also determined. A total of 90 wells were found to be positive for DBCP, with 59 of these occuring on the east side of the San Joaquin Valley. The average concentration for positive wells in this area was 5.0 ppb DBCP. Wells less than 100 ft (305 m) deep were more likely to be contaminated. Samples of milk produced at 10 dairies in areas where DCBP had been used were all negative. All water samples were negative for the other pesticides determined. It is concluded that DBCP residues in water may persist for a number of years, and it is not likely that further agricultural use of DBCP should be authorized.

80-1569. Shaver, T. N.; Bull, D. L. (Cotton Insects Res. Lab., Agric. Res., SEA, USDA, College Station, TX 77840) **Environmental fate of methyl eugenol.** *Bull. Environ. Contam. Toxicol.* 24(4): 619-626; 1980 (6 references).

The environmental fate of methyl eugenol was studied. To study soil persistence 2 ml hexane solution containing 10 mg of methyl eugenol were distributed evenly over 100 g of fine sandy loam mixed with water. In studies of persistence in water, 10 mg of methyl eugenol was added to 100 ml of water. All water and soil samples were incubated at 22 or 32°C, and at various intervals were removed, extracted with dichloromethane, and analyzed by gas chromatography. Methyl eugenol dissipated rapidly from both soil and water. At 32°C, 98% of the material was lost within 96 hr, and 77 and 81% were lost from water and soil, respectively, after 96 hr at 22°C. The half-life of methyl eugenol in soil and water was 6 hr at 32°C, and 16 and 34 hr in soil and water (respectively) at 22°C. In experiments in which methyl eugenol treated filters were placed on the soil surface or embedded 2 cm under the soil surface, 14% (surface) and 22% (embedded) of the treatment dose remained on the filter after 12 days, showing a half life in cigarette filters of 4-4.5 days. In soil leaching studies, ^{14}C-labeled methyl eugenol was found to be immobile in the three soils tested. Mature field-grown tomato plants were treated with 1 mg of ^{14}C-labeled methyl eugenol, and tomatoes were harvested at various intervals post-treatment. External (unabsorbed) methyl eugenol was determined by liquid scintillation after rinsing each tomato with dichloromethane, and only 3.8% of the dose was recovered in the external wash after 24 hr. Total internal accumulation of radiocarbon was 4 ppm (based on wet wt) after 14 days.

80-1570. Eberspaecher, J.; Lingens, F. (Inst. Mikrobiol., Univ. Hohenheim, D-7000 Stuttgart 70, BRD) **Degradation microbienne de l'herbicide Pyramin. [Microbial degradation of the herbicide Pyramin.]** *Bull. Soc. Chim. Fr.* (1-2): II71-II75; 1980 (23 references) (French).

The herbicide Pyramine (active agent chloridazone), widely used in sugar beet cultures, was found to be decomposed by soil bacteria. The bacterial strain was isolated and described. It was found to resemble *Pseudomonas*, except that the bacteria are immobile, and it is suggested that they represent a new genus. Chloridazon was found to be dephenylated to a new amino-acid, L-2,3-

dihydroxy-phenylalanine. Further degradation is mediated by mycobacteria. Decomposition of chloridazone in the soil by bacteria takes several weeks, and it is recommended that crops treated with Pyramine be analyzed for chloridazone residue and metabolite content.

80-1571. Nemec, S. (Agric. Res., SEA, USDA, Orlando, FL 32803) **Effects of 11 fungicides on endomycorrhaizal development in sour orange.** *Can. J. Bot.* 58(5): 522-526; 1980 (24 references).

Vesicular-arbuscular mycorrhizal (VAM) fungi increase the uptake of essential plant growth elements, and there is a need to elucidate the effects of pesticides on these soil organisms. *Glomus etunicatus* and *G. mosseae* were treated with 11 fungicides (copper, formaldehyde, thiabendazole, metalaxyl, chloroneb, captan, captafol, benomyl, maneb, chlorthalonil and sodium azide) in 5 different tests situations. Mycorrhizal plant growth was not adversely affected by captafol, chloroneb, metalaxyl or captan. Captafol and formaldehyde at all doses and high rates of captan, maneb, chlorthalonil and sodium azide adversely affected fungal development. Benomyl and thiabendazole reduced plant growth at all rates. Copper was found to be more phytotoxic than fungitoxic.

80-1572. Pritchard, M. K.; Stobbe, E. H. (Dep. Plant Sci., Univ. Manitoba, Winnipeg, Manitoba R3T 2N2, Canada) **Persistence and phytotoxicity of dinitroaniline herbicides in Manitoba soils.** *Can. J. Plant. Sci.* 60(1): 5-11; 1980 (27 references).

The persistence and phytotoxicity of dinitramine (N^4,N^4-diethyl-α,α,α-trifluoro-3,5-dinitrotoluene-2,4-diamine), fluchloralin [N-(2-chloroethyl)-2,6-dinitro-N-propyl-4-(trifluoro-methyl)aniline], profluralin [N-(cyclopropylmethyl)α,α,α-trifluoro-2,6-dinitro-N-propyl-p-toluidine], and trifluralin (α,α,α-trifluoro-2,6-dinitro-N-N-dipropyl-p-toluidine) were compared in 3 Manitoba soils: sandy loam, clay loam and clay. The phytotoxicities of all chemicals decreased with increased organic matter. The phytotoxicities of the dinitroanilines were: dinitramine > trifluralin > profluralin = fluchloralin. Increased organic matter increased the persistence of trifluralin and fluchloralin. Profluralin and dinitramine persistence increased with increased with increased clay and organic matter content. Profluralin was the most persistent chemical over all soil types. Under environmental conditions that retard dinitroaniline loss from Manitoba soils, residues of some of these herbicides may cause crop injury the year after application. (Author abstract by permission)

80-1573. Grover, R.; Smith, A. E.; Korven, H. C. (Res. Stn., Agric. Canada, Regina, Saskatchewan S4P 3A2, Canada) **A comparison of chemical and cultural control of weeds in irrigation ditchbanks.** *Can. J. Plant. Sci.* 60(1): 185-195; 1980 (13 references).

The residual herbicides, applied at soil sterilant rates, atrazine (22.4 kg/ha), bromacil (15.2 kg/ha), monuron (38.5 kg/ha), and simazine (22.4 kg/ha), were reapplied during September of 1973 to the same ditches that had received similar treatments in September of 1970. The foliar herbicidal applications of paraquat (2.2 kg/ha), dalapon + amitrol-T (11.2 + 2.2 kg/ha), paraquat + diquat (1.1 + 1.1 kg/ha), as well as the growth retardant chlorflurenol (3.6 kg/ha), were applied annually each June from 1971 until 1976. Soil (up to 120 cm depths) and water were sampled at 3, 4, and 5 days after the 1973 residual herbicide treatments and additional water samples were collected in 1975. Concentrations in the top 7.5 cm of the soil in 1973 ranged from 16 to 25 ppm. A gradual decrease of residues in the upper soil layers were noted with time. Simazine was found largely in the top 22.5 cm and bromacil was found at close to 120 cm depths. In water samples in 1973 residues ranged from 31 to 354 ppb and in 1975 from 5 to 170 ppb. The transport of these herbicides in the initial water flush and their leaching into the soil profile were shown to be potential hazards for contamination. Amitrol, dalapon and paraquat residues in ditchbank water ranged from 2 to 34 ppb when sampled 3, 4 and 5 days after foliar applications in 1975. (Author abstract by permission, modified)

80-1574. Hayden, B. J.; Smith, A. E. (Res. Stn., Agric. Canada, Regina, Saskatchewan S4P 3A2, Canada) **Persistence of herbicides in three Saskatchewan soils.** *Can. J. Plant. Sci.* 60(1): 311-313; 1980 (6 references).

The persistence of 5 herbicides under field conditions was studied at 3 locations in Saskatchewan over a 3-yr period. Carryover of alachlor, asulam, and benazolin from one growing season to the next was minimal, whereas carryover of niclofen (nitrofen) and profluralin was observed. (Author abstract by permission)

80-1575. Macy, A. M.; Kutchinsky, L. E.; Wislocki, A. (Med. Cent., Univ. Colorado, Denver, CO) **A comparative cross sectional study of pesticide residue in human breast milk, cows' milk, canned milk, and infant formula in Colorado.** *Clin. Toxicol.* 15(4): 482; 1979.

Breast milk from 100 Colorado mothers was analyzed for pesticide residue and compared with residues found in cows' milk, canned milk, and infant formula. Methodology consisted of initial and follow-up questionnaires and chemical analysis of samples. Contributing factors studied included environmental and behavioral influences on residue levels. Levels of DDT, DDE, dieldrin, lindane, and PCBs were found in breast milk far in excess of those in cows' milk and infant formula. Phthalate esters were also found in some of the breast milk samples. [Presented at the 1979 annual meeting.] (Author abstract by permission)

80-1576. Leavitt, J. R. C. (Univ. Nebraska, Lincoln, NE) **Influencing the action of herbicides. Soil, chemical pH.** *Crops Soils* 32(7): 13-15; 1980.

Soil pH is an important factor which affects the ability of a soil to support plant growth. It can also affect the amount of herbicide which will bind to the soil, the non-biological breakdown of triazine herbicides, and the microbiological breakdown of all herbicides. Consideration is given to the relationship of the acidity of the soil to various properties of the soil. The chemical structure of the herbicide itself is significant. Many are ionic and, when dissolved in water, give off or attract hydrogen ions, depending on the pH of the solution. Still others are nonionic, but may be polar and thus affected by soil pH. Others are so basic that they are positively charged at virtually all soil pH values. The relation of herbicide type to adsorption, phytotoxicity, non-biological breakdown and persistence at various pH levels is discussed.

80-1577. Riesselman, J. H. (Univ. Nebraska, Lincoln, NB) **Effects of non-target pesticides on *Corynebacterium nebraskense* and Goss's bacterial wilt of corn.** *Diss. Abstr. Int. B* 40(8): 3518; 1980.

Effects of non-target pesticides on *Corynebacterium nebraskense* and Goss's bacterial wilt and leaf blight of corn (*Zea mays* L.) were investigated. No stimulatory growth effects *in vitro* were observed. Inhibitory effects were observed *in vitro* when the bacterium was subjected to 10 and 100 μg/ml alachlor, butylate and EPTC. Atrazine and dicamba at 10 μg/ml produced no inhibitory effect, but atrazine at 100 μg/ml slightly inhibited growth. No effects were observed with the insecticides tested. No change in pathogen virulence and colony morphology were apparent following exposure to all pesticides tested. *In vivo* investigations in herbicide amended soil at recommended and threefold higher rates revealed no significant differences in disease severity. Corn plants growing in a nutrient solution containing 10 and 100 μg/ml herbicide were inoculated with 10^2 and 10^3 cells per plant. At the lower inoculum level, alachlor treated plants had up to a 97% reduction in colony forming units/g leaf tissue. At 10^3 cells/plant there was no noticeable reduction in colony forming units. Other herbicides tested did not exhibit this bacteriostatic effect. Leaf disc bioassays of tissue gathered from alacholor treated plants revealed a light zone of inhibition surrounding the disc. As the concentration of overlaid bacteria increased the corresponding zone in inhibition decreased. (Author abstract by permission. Copies of the thesis are available from University Microfilms, order No. 8003372)

80-1578. Au, L. A. (Univ. Illinois, Urbana-Champaign, IL) **Pesticide interactions in the laboratory rice paddy model ecosystem.** *Diss. Abstr. Int. B* 40(8): 3567-3568; 1980.

The pesticide interactions of 3 pesticide combinations, methyl parathion (MP) + atrazine (AT), carbaryl (CB) + PCNB (PC; quintozene), and CB + propanil (PL), in a laboratory rice paddy model ecosystem and how the combination of MP with AT or PC affects the metabolism and/or toxicity in rice, mosquito fish, snails, mosquito larvae, water fleas, house flies and rats were studied. Combination of MP with AT substantially decreased the degradation of MP in the roots of rice, increased the elimination of MP and its metabolites in rice shoots and increased the persistence of MP in the aquatic and terrestrial phases. The combination also increased the leaching of AT residues from the terrestrial phase to the aquatic phase, substantially decreased the degradation of AT in rice and also increased the persistence of AT in the water and terrestrial phases. Combination of CB with PC decreased the degradation and elimination of CB in rice, substantially increased the biomagnification of CB in algae and snails and substantially decreased the persistence of CB in the terrestrial phase. There was also decreased uptake of PC in rice, substantially increased biomagnification of PC in algae, water fleas and snails and decreased persistence of PC in the terrestrial phase. Combination of CB + PL consistently lowered the level of CB residues in the water phase, increased the metabolism and elimination of CB and its metabolites in rice, substantially increased CB biomagnification in snails and CB biodegradability in algae and decreased CB persistence in the terrestrial phase. There was also substantially decreased degradation of PL in rice, increased persistence of PL in the terrestrial phase and substantially increased biodegradability of PL in algae. Combination with AT or PC in toxicological assays significantly increased the toxicity of MP to water fleas. The results of the metabolism studies were comparable to the findings of the model ecosystem studies and the toxicological assays. (Author abstract by permission, abridged. Copies of the thesis are available from University Microfilms, order No. 8004126)

80-1579. Ferreira, G. A. L. (Univ. California, Davis, CA) **Volatilization and other loss routes for *N*-methylcarbamate insecticides systemically applied to rice plants: uptake, distribution, and loss as a function of insecticide physicochemical properties.** *Diss. Abstr. Int. B* 40(8): 3707-3708; 1980.

Rice seedlings were treated by root soak or foliar spray with carbofuran (CF), carbaryl (CB) or aldicarb (AL). Treated plants were kept for 10 days in a small glass chamber through which air passed continuously for 12 hr/day. The plant culture media, plant parts, outflow vapor trap, and chamber walls were analyzed for parent carbamate. For AL, CB and CF, 23.6% (960 μg), 8.3% (367 μg) and 5.8% (290 μg), respectively, of the initial plant residue was lost by volatilization following root soaking. Analysis of plant parts at intervals following root soak treatment indicated that rapid translocation of the carbamates to leaf surfaces preceded volatilization. Rice

plants in the field were treated by root soak followed by gelatin capsule or by foliar spray followed by hand broadcast. The levels of CF in the air from the root soaking were half those from foliar spray (26.5 *vs* 47.2 $\mu g/m^3$). Subsequent root-zone treatments with gelatin CF had greater aerial residues than hand broadcast treatments (21.1 *vs* 15.6 $\mu g/m^3$) at day 1. The chemicals were found to accumulate rapidly in the leaves, move predominantly to the leaf tips, and exit from the tip via guttation flow; the outside tips were covered with insecticide deposits from which vaporization could occur. Systemics were also lost from plant roots via exudation; laboratory root soak experiments revealed 53%, 42%, and 43% of AL, CF and CB absorbed by plants on day 0 were found in the culture media 10 days after treatment. Uptake, distribution and loss of the insecticides were correlated with the insecticides physicochemical properties. (Author abstract by permission, abridged. Copies of the thesis are available from University Microfilms, order No. 8003504)

80-1580. Anonymous **Pesticide acephate (Orthene) residues in California tomatoes.** *Drug. Intell. Clin. Pharm.* 14(1): 78; 1980.

Seven of 50 tomato farms surveyed by the US FDA in the Los Angeles area were found to have their crops contaminated with 1 ppm of the pesticide acephate. Despite California laws and US FDA regulations against the use of acephate on tomatoes, management of 6 of the farms admitted deliberate application of acephate. The California Department of Agriculture quarantined the tomato farms which were found to be contaminated. All but one of the tomato shipments were voluntarily destroyed.

80-1581. Kenaga, E. E. (Health & Environ. Sci., Dow Chem. Co., Midland, Michigan) **Predicted bioconcentration factors and soil sorption coefficients of pesticides and other chemicals.** *Ecotoxicol. Environ. Saf.* 4(1): 26-38; 1980 (4 references).

A study is described in which bioconcentration factors (BCF) and soil sorption coefficients (K_{oc}) of chemicals can be predicted. Values were determined for 358 compounds, primarily pesticides, using known water solubility values. When possible, comparisons were made between predicted and actual values. Chemicals with water solubilities below 0.1 ppm were seen to have the highest BCF values. The highest K_{oc} values were generally seen to be associated with chemicals with low water solubility. It is concluded that the easily calculated BCF and K_{oc} values are useful for the estimation of partitioning the soil and animal tissues. Early assessment of risk is therefore greatly enhanced. BCF and K_{oc} values were not found to be good indicators of the type of biological activity (insecticide, fungicide or herbicide).

80-1582. Kingsbury, P. D. (For. Pest Manage. Inst., Sault Ste. Marie, Ontario, Canada) **A study of the distribution, persistence and biological effects of fenitrothion applied to a small lake in an oil formulation.** *For. Pest. Manage. Inst. Rep.* FPM-X-13: 56 pp.; 1978 (10 references).

A small lake was treated with 140 g fenitrothion/ha. Levels of emitted spray products reaching the lake surface waters 30 min after treatment ranged from 0.83-5.80 $\mu g/l$. Levels detected 4 hr after treatment were 0.52-0.83 $\mu g/l$. Persistence in surface waters was about 1 wk. Trace levels of the pesticide were found below the epilimnion. Fenitrothion levels in the sediment 3 days after treatment were 0.5-9.7 $\mu g/kg$. Brook trout caged at the lake surface accumulated peak body residue levels of 0.2 $\mu g/g$ within the first 12 hr after treatment. These amounts did not result in any apparent changes in the fish. Fish below the thermocline accumulated trace amounts of the chemical. Depressed surface populations of zooplankton and phantom midge larvae, *Chaoborus* sp., were noted for short periods of time. Benthic invertebrates, emerging insects and amphibians in the lake demonstrated no substantial impact from the exposure.

80-1583. Cherkinskii, S. N.; Mazaev, V. T.; Vasilenko, V. E. (I. M. Sechenov First Med. Inst., Moscow, USSR) **Voprosy zagriazneniia gruntovykh vod pri primenenii khlorkolinkhlorida v sel'skom khoziaistve. [Contamination of ground waters after agricultural application of chlorocholine chloride.]** *Gig. Sanit.* 45(1): 15-18; 1980 (10 references) (Russian).

The migration of the plant growth regulator chlorocholine chloride (chlormequat chloride; CCC) into ground waters was evaluated. A 0.4 ha plot was sprayed with CCC (6 kg); samples of ground waters were withdrawn 24, 36, 60, 90 and 120 hr after treatment. The major factor affecting the rate of migration of CCC was the amount of rainfall; type of soil and dose of CCC had lesser effects on its migration. On day 3-5 of the experiment, the aqueous extracts contained CCC as well as its metabolites choline chloride (CC) and trimethylamine hydrochloride (TMAC).

80-1584. Zakharov, B. N. (Reg. Sanit. Epidemiol. Stn., Arkhangelsk, USSR) **Migratsiia khlorofosa v prirodnykh usloviiakh. [Migration of chlorophos in nature.]** *Gig. Sanit.* 45(1): 62-63; 1980 (Russian).

The migration of chlorophos (trichlorfon) was monitored in 3 agricultural regions. Soil and water samples were collected once every 10 days for 63 days. Chlorophos residues were determined by thin layer chromatography. The obtained data indicated that chlorophos migrated into drainage waters, and could travel a significant distance. The movement of the pesticide depended upon the rainfall. Concentrations of the pesticide found in the waste waters and bodies of water exceeded the maximum permissible concentration (0.05 mg/l).

80-1585. Sapegin, D. I.; Kal'sada, I. N.; Kucher, A. G.; Severinov, I. S. (Crimean Med. Inst., Simferopol, USSR) **Izuchenie sposobnosti rapy i griazi Sakskogo ozera k camoochishcheniiu ot khloroganicheskikh pestitsidov. [Ability of brine and mud of Sakskyi lake for self-purification from organochlorine pesticides.]** *Gig. Sanit.* 45(1): 65-66; 1980 (2 references) (Russian).

An attempt was made to evaluate the ability of brine and mud from Sakskyi Lake to degrade organochlorine pesticides. The pesticide DDT, lindane and Kelthane (dicofol) were added to the samples (200 μg pesticide/50 μg mud and 200 μg pesticide/100 ml brine) and the samples were incubated at 24.5°C up to 90 days. Pesticide levels were determined immediately after mixing, and on days 1, 5, 15, 30, 60 and 90. DDT showed the greatest stability in the brine: less than 33% of the original amount was degraded after 90 days incubation. Kelthane was the least stable pesticide (100% degradation was recorded after day 19). All pesticides persisted in the mud.

80-1586. Saxena, M. C.; Seth, T. D.; Mahajan, P. L. (Ind. Toxicol. Res. Cent., Lucknow 226001, India) **Organochlorine pesticides in human placenta and accompanying fluid.** *Int. J. Environ. Anal. Chem.* 7(3): 245-251; 1980 (11 references).

Gas-liquid chromatography using an electron capture detector was used to determine organochlorine pesticide levels in 50 specimens of placenta and accompanying fluid. Samples were collected in 1978 in India from women of the general population. No correlation between pesticide levels and age, race or residence of subjects was found. Lindane was detected in all specimens, with a mean level of 389.64 ppb in the placenta and 27.12 ppb in the fluid. Other compounds detected were BHC, DDT, DDE, DDD (TDE) and aldrin. The geometric mean DDT levels were 200.91 ppb in placental specimens and 23.83 ppb in fluid specimens. Aldrin levels were 158.7 ppb for placenta and 20.76 ppb for fluid. The placenta was found to store higher amounts of pesticide than the accompanying fluid. It is suggested that more extensive studies are required to determine the significance of these findings in relation to miscarriages, stillbirths and birth defects.

80-1587. Richter, E. D.; Cohen, B.; Luria, M.; Schoenberg, J.; Weisenberg, E.; Gordon, M. (Dep. Med. Ecol., Hadassah Med. Sch., Hebrew Univ., Jerusalem, Israel) **Exposures of aerial spray workers to parathion.** *Isr. J. Med. Sci.* 16(2): 96-100; 1980 (9 references).

The air and skin exposures of agricultural pilots and ground crews to parathion aerosols and vapors were investigated. Cockpit air samples were taken by midget impingers containing ethylene glycol. Skin exposure was assessed by filter papers wetted with ethylene glycol attached to workers' shirts. Analysis was by gas chromatography. Pilots also filled out a questionnaire describing symptoms. During air sampling periods of less than 30 min the parathion levels ranged from not detectable to 440 $\mu g/m^3$, with the threshold limit value (100 $\mu g/m^3$) being exceeded in 7 of 12 cases. In 2 of 19 sampling periods of more than 30 min the TLV was exceeded. Among ground crew members, the acceptable daily parathion intake (0.005 mg/kg body wt) was frequently exceeded. Data on skin exposure was insufficient to determine whether pilot skin absorption occurs as a result of ground level exposure, contaminated cockpits, or both. Four of the 16 pilots who filled in questionnaires reported transient muscle weakness, blurred vision, dizziness, nausea and headache when they smelled pesticides in the cockpit. Ten pilots reported that after 4 hr of flying their coordination and alertness were impaired. It is concluded that aerial spray pilots are transiently exposed to parathion, at times above the threshold levels, and that exposure levels for ground crews are high. Recommendations are made for improving work practices at loading and landing sites, and for decreasing cockpit exposure.

80-1588. Galiulin, R. V.; Sokolov, M. S.; Pachepskii, Ia. A.; Ryzhaya, M. A. (Author address not given) **Deistvie nekotorykh ekofaktorov na razlozhenie v pochve propanida, linurona i produkta ikh transformatsii 3,4-dikhloranilina. [Effect of some ecological factors on the degradation of propanil, linuron and their metabolite 3,4-dichloroaniline in soil.]** *Izv. Akad. Nauk SSSR Ser. Biol.* (5): 683-699; 1978 (40 references) (Russian).

In an attempt to develop a method of ecotoxicological simulation, the rate of degradation of the phenylurea derivative linuron, acylanilide Propanide (propanil) and their metabolite 3,4-dichloroaniline was studied in a soddy-podzolic soil. It was found that the rate of degradation of xenobiotics depended upon the initial concentration, temperature and humidity of the soil, soil pH, concentration of sources of carbon, and concentration of nitrous and phosphorous fertilizers.

80-1589. Rosenberg, A.; Alexander, M.* (Lab. Soil. Microbiol., Dep. Agron., Cornell Univ., Ithaca, NY 14853) **Microbial metabolism of 2,4,5-trichlorophenoxyacetic acid in soil, soil suspensions, and axenic culture.** *J. Agric. Food Chem.* 28(2): 297-302; 1980 (19 references).

In the decomposition of 2,4,5-trichlorophenoxyacetic acid (2,4,5-T) in soil and soil suspension, 2,4,5-trichlorophenol appeared and then disappeared. No 2,4,5-T decomposition was evident in soil or soil suspension sterilized by γ-irradiation. A soil isolate of *Pseudomonas fluorescens* destroyed about 70% of the 2,4,5-T added to a glucose inorganic salts medium in 80 hr, and nearly 60% of the herbicide that was metabolized was recovered as 2,4,5-trichlorophenol. The bacterium did not use the trichlorophenol as a carbon source, and it did not

release $^{14}CO_2$ from uniformly ring-labeled 2,4,5-Trichloro [^{14}C] phenol or uniformly ring-labeled 2,4,5-[^{14}C]T. Soil suspensions converted 8% of labeled 2,4,5-T and 40% of labeled 2,4,5-trichlorophenol to $^{14}CO_2$ in 25 days. 2,4,5-Trichlorophenol was converted by microorganisms in the soil suspensions to products that were identified as 3,5-dichlorocatechol, 4-chlorocatechol, and succinate by gas chromatography and mass spectrometry and to products that were tentatively identified as *cis,cis*-2,4-dichloromuconate, 2-chloro-4(carboxymethylene)-but-2-enolide, and chlorosuccinate by gas and thin-layer chromatography. On the basis of these results, a pathway of 2,4,5-T decomposition is proposed. (Author abstract reprinted by permission of the American Chemical Society)

80-1590. Rhodes, R. C. (Biochem. Dep., Res. Div., Exp. Stn., E. I. duPont de Nemours & Co. Inc., Wilmington, DE 19898) **Soil studies with ^{14}C-labeled hexazinone.** *J. Agric. Food Chem.* 28(2): 311-315; 1980 (11 references).

The active ingredient in Velpar weed killer is hexazinone. Under field conditions, the half-life of intact [^{14}C] hexazinone in soil treated at 3.7 kg/ha was *ca.* 1 mo in Delaware (DE), 2 mo in Illinois (IL), and 6 mo in Mississippi (MS). The time for 50% loss of total radioactive residues was *ca.* 3-4 mo in DE, 6-7 mo in IL, and 10-12 mo in MS. The major degradation product at all locations was 3-(4-hydroxycyclohexyl)6-(methylamino)1-methyl 1,3,5-triazine-2,4(*1H,3H*)-dione. Greenhouse soil degradation tests on both silt loam and sandy loam soil showed a half-life of intact hexazinone of less than 4 mo. Laboratory biometer flask studies to determine microbial degradation in the dark in 2 soil types showed that 45-75% of the applied radioactivity was evolved as $^{14}CO_2$ during an 80 day incubation period. Soil thin-layer chromatography data place hexazinone in class 4 in the mobility classification of Helling and Turner. (Author abstract reprinted by permission of the American Chemical Society)

80-1591. Nash, R. G.; Beall, M. L., Jr. (Pestic. Degrad. Lab., Agric. Environ. Qual. Inst., Agric. Res., SEA, USDA, Beltsville, MD 20705) **Fate of maneb and zineb fungicides in microagroecosystem chambers.** *J. Agric. Food Chem.* 28(2): 322-330; 1980 (20 references).

Maneb and zineb (EBDC) fungicides were applied twice to tomato plants at 2 kg/ha. The residual fungicides [measured as ethylenediamine (EDA)] and ethylenethiourea (ETU) were monitored on the tomato fruit and leaves and in the soil, water, and air for 100 days after treatment. ETU was detected at <20 ppb on whole fruit after 3 days but completely dissipated after 3 wk even though maneb and zineb were measurable (as EDA) after 10 wk. Maneb and zineb were present on whole fruit at <1 ppm. Both had half-concentration times ($c_{1/2}$) of 14 days on leaves. Half-concentration times for ETU, maneb, and zineb on soil were <3, 36, and 23 days, respectively. The $c_{1/2}$ of maneb in air was 7-14 days and that for zineb was 14-11 days as measured by GLC and ^{14}C analysis, respectively. Half-concentration time for ETU in air was 9 days. (Author abstract reprinted by permission of the American Chemical Society)

80-1592. Ivie, G. W.; Bull, D. L.; Veech, J. A. (Vet. Toxicol. & Entomol. Res. Lab., Agric. Res., SEA, USDA, College Station, TX 77840) **Fate of diflubenzuron in water.** *J. Agric. Food Chem.* 28(2): 330-337; 1980 (29 references).

The fate of the insect growth regulator diflubenzuron (Dimilin) was studied in distilled water and in acidic (pH 4.0) and alkaline (pH 10.0) buffers. Heat (121°C) catalyzed degradation of diflubenzuron in these aqueous media at levels greatly above its solubility in water resulted in rapid degradation to as many as 7 identified products: (4-chlorophenyl)urea, 2,6-difluorobenzoic acid, 2,6-difluorobenzamide, 4-chloraniline, *N,N'*-bis(4-chlorophenyl) urea, a 2,4-quinazolinedione derivative that resulted from expulsion of HF from diflubenzuron with cyclization at the anilino nitrogen and the *o*-carbon of the benzoyl ring, and a further reaction product of the quinazolinedione compound. Under less vigorous conditions (0.1 ppm of [^{14}C] diflubenzuron in water of buffer, 36°C), the rate of degradation was highly dependent upon pH. At pH 10.0, the half-life of diflubenzuron was < 3 days; but at pH 4.0, degradation was not detected even after 56 days. In distilled water (pH ~ 6.0), the half-life of diflubenzuron was about 7 days. The major degradation products were (4-chlorophenyl)urea, and 2,6-difluorobenzoic acid, but small amounts of 2.6-difluorobenzamide and the quinazolinedione product were also formed. When tested as an ovicide against the boll weevil or as a mosquito larvicide against *Culex quinquefasciatus*, the quinazolinedione derivative did not exhibit appreciable diflubenzuron-like biological activity. (Author abstract reprinted by permission of the American Chemical Society)

80-1593. Dumas, T. (Res. Inst., Agric. Canada, London, Ontario N6A 5B7, Canada) **Phosphine sorption and desorption by stored wheat and corn.** *J. Agric. Food Chem.* 28(2): 337-339; 1980 (9 references).

The sorption and desorption of PH_3 (hydrogen phosphide) from wheat treated with concentrations of 0.5-5 mg/kg wheat were determined at 25, 45, and 85°C. The desorbed PH_3 was extracted from the air by passing through a cold trap; here sufficient quantities of the gas could be accumulated for accurate analysis by GLC. Most of the PH_3 was desorbed in the first 2-3 days but small amounts continued to desorb for many wk following treatment. After 220 days of aeration, PH_3 was still present in the grain and desorbing at the rate of ppt (10^{-12}g). For a

wide range of concentrations, about 10% of the PH_3 applied was found to be adsorbed. The amount of physically sorbed PH_3 increased with the fumigant concentration applied and with the length of exposure. Because of reduced reactivity even when the temperature was increased to 85°C for several days, unreacted PH_3 still desorbed slowly from wheat. Corn aerated 26 days desorbed 0.004 ng/g in 2 days. (Author abstract reprinted by permission of the American Chemical Society)

80-1594. Spencer, W. F.; Adams, J. D.; Shoup, T. D.; Spear, R. C. (Agric. Res., SEA, USDA, Univ. California, Riverside, CA 92521) **Conversion of parathion to paraoxon on soil dusts and clay minerals as affected by ozone and UV light.** *J. Agric. Food Chem.* 28(2): 366-371; 1980 (18 references).

The persistence of parathion and its conversion to the highly toxic paraoxon on soil dusts and monoionic clay minerals were measured in environmental chambers with various rates of atmospheric ozone with and without ultraviolet (UV) light. The oxidation of parathion to paraoxon on soil dust was controlled mainly by ozone concentrations and the type and thickness of soil dust. Rates of paraoxon production were maximum at high ozone levels in the presence of UV light. Neither ozone alone, nor UV light alone, effectively produced paraoxon on the soil dust. When dry monoionic clays were exposed to 300 ppb ozone and UV light, the kaolinite clays more effectively catalyzed the oxidation of parathion to paraoxon than the montmorillonite clays. In oxidizing parathion to paraoxon the Cu-saturated clays were most effective, and the Ca-saturated montmorillonite clay (the dominant species in many agricultural soils of California) was least effective. (Author abstract reprinted by permission of the American Chemical Society)

80-1595. Maguire, R. J.; Hale, E. J. (Process Res. Div., Natl. Water Res. Inst., Dep. Environ., Burlington, Ontario L7R 4A6, Canada) **Fenitrothion sprayed on a pond: kinetics of its distribution and transformation in water and sediment.** *J. Agric. Food Chem.* 28(2): 372-378; 1980 (36 references).

Water, suspended solids, and sediment samples were collected from a small pond in a spruce fir forest in New Brunswick, Canada, before and after the spraying of a fenitrothion formulation for spruce budworm control, and the samples were analyzed for fenitrothion and its degradation and transformation products. Fenitrothion concentrations in water, suspended solids, and sediment fell below detectable levels 2 days after the spray. The only identified products were *p*-nitro-*m*-cresol in water, which persisted less than 2 days, and aminofenitrothion in sediment, which persisted less than 4 days. Laboratory experiments indicated that chemical hydrolysis and volatilization of fenitrothion from true solution were both slow processes; however, volatilization of fenitrothion from surface slicks of its formulation sprayed on water was very fast ($t_{1/2}$ = 18 min at 20°C). (Author abstract reprinted by permission of the American Chemical Society)

80-1596. Fuhremann, T. W.; Lichtenstein, E. P.* (Dep. Entomol., Univ. Wisconsin, Madison, WI 53706) **A comparative study of the persistence, movement, and metabolism of six carbon-14 insecticides in soils and plants.** *J. Agric. Food Chem.* 28(2): 446-452; 1980 (27 references).

A comparative study was conducted to investigate the fate of six insecticides in two soil types and oat plants grown in these soils. All systems were incubated under identical environmental conditions. The insecticides used, in order of increasing water solubility were [^{14}C] DDT, [^{14}C] lindane, [^{14}C] fonofos, [^{14}C] parathion, [^{14}C] phorate, and [^{14}C] carbofuran. Total amounts of ^{14}C residues recovered from insecticide treated loam soils plus oats grown in these soils were similar with DDT and carbofuran. They were also higher than those observed with the other insecticides. While most of the [^{14}C] DDT residues remained in the soils, most of the [^{14}C] carbofuran residues were recovered from oat leaves in the form of carbofuran and 3-hydroxycarbofuran. ^{14}C residues of all insecticides were more persistent in loam than in sandy soil and sand-grown oats took up more ^{14}C insecticide residues the loam-grown oats. The more water-soluble insecticides [^{14}C] phorate and [^{14}C] carbofuran, were more mobile and were metabolized to a greater extent than insecticides of lower water solubilities. Unextractable (bound) ^{14}C residues in loam soil ranged from 2.8 to 29.1% of the applied doses of [^{14}C] DDT and [^{14}C] parathion, respectively. Bound ^{14}C residues were lower in the sandy soil than in the loam soil; however, plant-bound ^{14}C residues were higher in oats grown in the sandy soil than in loam-grown oats. Insecticide metabolites recovered from soils and plants were identified and quantitated whenever possible. The oxygen analog metabolites of the organophosphorus insecticides were most abundant in the sandy soil and in oats grown therein. Data illustrate the importance of chemical structure, water solubility, and soil type in predicting the comparative environmental behavior of pesticides. (Author abstract reprinted by permission of the American Chemical Society)

80-1597. Klopping, H. L.; Delp, C. J. (Biochem. Dep., Res. Div., Exp. Stn., E. I. duPont de Nemours & Co. Inc., Wilmington, DE 19898) **2-Cyano *N*-(ethylamino)carbonyl 2-(methoxyimino)acetamide, a new fungicide.** *J. Agric. Food Chem.* 28(2): 467-468; 1980 (8 references).

2-Cyano-*N*-[(ethylamino)carbonyl]-2-(methoxyimino) acetamide (DPX-3217; active ingredient in Dupont Curzate fungicide) is a new chemical compound with systemic properties. It provides excellent post-infection curative as well as protectant activity at 80 mg AI/l for con-

trol of late blight of tomato and potato (*Phytophthora infestans*) and grape down mildew (*Plasmopora viticola*). The material has a low acute mammalian toxicity pattern with an oral LD50 for male rats of 1425 mg/kg for an 80% active formulation and shows no evidence of cumulative toxicity. It has a residual life of a few days and a high degree of safety to many grape, potato, and tomato varieties. DPX-3217 was not mutagenic in Ames *Salmonella* assays. The half-life of DPX-3217 is less than 2 wk in all soils. In soil column leaching tests, after 4 wk exposure with up to 10 cm rain, > 90% of residual radioactivity remained in the upper 5 cm. (Author abstract reprinted by permission of the American Chemical Society, supplemented.)

80-1598. Perfect, T. J.; Cook, A. G.; Critchley, B. R.; Critchley, U.; Davies, A. L.; Swift, M. J.; Russell-Smith, A.; Yeadon, R. (Cent. Overseas Pest Res., London W8 5SJ, England) **The effect of DDT contamination on the productivity of a cultivated forest soil in the sub-humid tropics.** *J. Appl. Ecol.* 16(3): 705-719; 1979 (25 references).

Studies were performed on cultivated forest-soil to determine the effects of DDT on seed production. In 1973 0.5 ha of forest was cleared and divided into 12 subplots. One set of plots was sprayed weekly with DDT. Cowpeas were grown on treated and untreated plots. Harvest data for 4 years of cultivation are presented. Yield was higher in DDT treated plots. However, there was a decline with time which was faster in treated plots than in non-treated plots. After the seventh season, the DDT no longer enhanced cowpea production. Maize was grown in all plots without the application of DDT during the first season of 1977. Crop production was lowest in previously sprayed plots. Depletion of soil nutrients was found to be equivalent for treated and untreated plots. It is suggested that the more rapid decline in fertility of treated plots is due to the effects of pesticides on soil microorganisms.

80-1599. Atkinson, S. A. (Dep. Nutr. & Food Sci., Fac. Med., Univ. Toronto, Toronto, Ontario M5S 1A8, Canada) **Chemical contamination of human milk: a review of current knowledge.** *J. Can. Diet. Assoc.* 40(3): 223-226; 1979 (6 references).

The incidence of PCBs, PBBs, DDT and its derivatives, aldrin, dieldrin and heptachlor in human adipose tissue and breast milk in Canada is reviewed. Outlines are presented of the risks and benefits of breastfeeding and how to minimize contamination of breast milk during pregnancy and lactation. Women at risk for breast milk contamination are described as those who may have had occupational exposure, exposure through consumption of fish from contaminated lakes and those who restricted their dietary intake and propentiate mobilization of lipid soluble chemical contaminants.

80-1600. Seo, S. T.; Akamine, E. K.; Goo, T. T. S.; Harris, E. J.; Lee, C. Y. L. (Hawaiian Fruit Flies Lab., Agric. Res., SEA, USDA, Honolulu, HI 96804) **Oriental and Mediterranean fruit flies: fumigation of papaya, avocado, tomato, bell pepper, eggplant, and banana with phosphine.** *J. Econ. Entomol.* 72(3): 354-359; 1979 (14 references).

Phosphine (aluminum phosphide) residues present after fumigation of packaged fruits and vegetables were determined. Phosphine was generated from a 9 × 9 cm FUMI-CEL, or from half of a FUMI-CEL tablet at 12.8°C (low-temperature) or at 18.5-25.1°C (ambient) temperatures. Residues of phosphine in cartons of papayas fumigated at low temperatures were 0.08 ppb, and after fumigation at ambient temperatures 1.0-1.4 ppb. Residues decreased to 0.18-0.3 ppb after 1 day of storage. Papayas and avocadoes were not injured by phosphine, but fumigated avocados ripened faster. Bell peppers, bananas, tomatoes, 5 varieties of avocados, and eggplants were not harmed by fumigation for 16-63 hr at exposure levels of 5500-20,000 ppm-hr at ambient temperatures.

80-1601. Chou, S. S.; Eto, M. (Dep. Agric. Chem., Kyushu Univ., Fukuoka 812, Japan) **Effects of paddy water and some photosensitizers on the photolysis of the fungicide isoprothiolane.** *J. Environ. Sci. Health B* 15(2): 135-146; 1980 (8 references).

Concentrations of 20 or 50 ppm isoprothiolane (diisopropyl 1,3-dithiolan-2-ylidenemalonate) in 450 ml solutions were irradiated by a UV light from a mercury lamp or by sunlight with or without additional chemical or rice root or paddy water extracts. Isoprothiolane decomposed slowly in deionized water under UV light and sunlight irradiation; the half-lives were 73.6 and 186 hr, respectively. Photodegradation was rapidly accelerated by the addition of paddy water extract; the half life during UV irradiation was 6.3 hr. Little effect on isoprothiolane photolysis was noted with soil extracts, rice plant extract or chlorophylls. Riboflavin greatly accelerated photodegradation and tryptophan, after a long lag time, slightly accelerated photodegradation. The degradation products were examined by TLC, HPLC, GLC, and NMR and UV spectrometry. In deionized water, after 105 hr UV irradiation, two decomposition products were found and one was identified as 1,3-dithiolan-2-ylidenemalonic acid.

80-1602. Deo, P. G.; Hasan, S. B.; Majumder, S. K. (Discipline Infest. Control & Pestic., Cent. Food Technol. Res. Inst., Mysore 570013, India) **Isomerization of β-HCH in aqueous solution.** *J. Environ. Sci. Health B* 15(2): 147-164; 1980 (15 references).

β-HCH (β-BHC) was purified by recrystallization and 5 mg were reacted with 125 ml autoclaved distilled H_2O for various time intervals at 25 ± 1°C. The filtrate was examined by GLC and was found to contain α, β, γ (lindane)

and δ-BHC isomers as well as some unidentified compounds. An instantaneous dehydrochlorination of β-BHC in distilled water was also observed. The acetone extract of the filtrate was further shaken for 4 days and bioassay toxicity studies were performed on mosquito and flour-beetle larvae and on houseflies. The toxicity of the extract was significantly greater than equal amounts of untreated β-BHC in acetone. The results indicate β-BHC may isomerize in aquatic environments and therefore, may be a potential source of more biologically active isomers in the environment.

80-1603. McKenry, M. V.; Naylor, P. (San Joaquin Valley Agric. Res. & Ext. Cent., Parlier, CA 93648) **Some factors causing variability in 1,2-dibromo-3-chloropropane concentrations in soil.** *J. Nematol.* 11(3): 260-264; 1979 (12 references).

Factors influencing the movement and concentrations in soil of 1,2-dibromo-3-chloropropane (DBCP) were investigated. Fumazone 86 EC (containing 1.45 kg AI DBCP/ha) treatments were applied at the rate of 81 kg/ha to Hanford sandy loam soils at different soil temperatures and moisture levels, and with or without tillage and planting of *Sorghum vulgare.* DBCP dispersal throughout the soil profile was irregular in comparison with other more volatile soil fumigants. Soil concentrations of the nematicide were reduced by low soil temperatures and in the presence of lime (5.4 tons/ha) or roots in the soil profile. DBCP applications by water or chisel injection enhanced movement to 1.2 m and below, but nematoxic concentrations were marginal below 0.9 m soil depth.

80-1604. Amico, V.; Oriente, G.; Piattelli, M.; Tringali, C. (Ist. Dip. Chim. & Chim. Ind., Univ. Catania, Catania, Italy) **Concentrations of PCBs, BHCs, and DDTs residues in seaweeds of the east coast of Sicily.** *Mar. Pollut. Bull.* 10(6): 177-179; 1979 (6 references).

PCB, DDT and BHC residue levels were determined by electron capture gas-chromatography in thalli of 12 species of marine algae collected at 3 stations along the east coast of Sicily. Results are discussed in comparison to data from earlier studies of animal species in the same area. The range of residue levels was 2.1-20.1 ng/g dry tissue for Σ DDT, 1.7-3.6 ng/g for Σ BHC, and 36.8-590.0 ng/g for Σ PCB. Highest concentrations were found in samples from an area suggested to be polluted by nearby industrial activity. Residue levels in algae were found to be significantly lower than residues in animal species (particularly the mussel *Mytilus galloprovincialis*) from similar habitats. This difference is suggested to be due to differences in lipid content. The ratio of Σ DDT/ΣPCB was found to be lower in algae than in mussels, and the ratio of Σ DDT/ΣDDE was consistently higher in algae. The peak patterns of PCB observed in algae were characterized by higher intensities of peaks and shorter retention time than those from animals. It is suggested that these differences may be due to a slower metabolic breakdown of DDT and PCB in algae than in animals. It is concluded that seaweeds can be useful indicators of contamination in coastal waters.

80-1605. Kar, S.; Singh, P. K. (Lab. Blue-Green Algae, Cent. Rice Res. Inst., Cuttack 753 006, Orissa, India) **Detoxification of pesticides carbofuran and hexachlorocyclohexane by blue-green algae *Nostoc muscorum* and *Wollea bharadwajac.*** *Microbios Lett.* 10(38-4): 111-114; 1979 (13 references).

Studies were designed to determine the ability of two N_2-fixing blue-green algae (*Nostoc muscorum* and *Wollea bharadwajae)* to detoxify the pesticides carbofuran and hexachlorocyclohexane (HCH; BHC). Exponentially growing algae cultures (0.5 ml) were inoculated to 9.5 ml of medium containing 2, 3, or 4 μg HCH/ml or 7.5, 15 or 30 μg carbofuran/ml. Growth (as determined by optical density) was measured after 10 days of incubation. Algae were removed by centrifugation, with 0.5 ml of fresh algal culture of the same optical density being inoculated every fifth day. Results indicated that algae grew poorly in the presence of the pesticides. After reinoculation of fresh algae, better growth was observed, and even more algal growth occurred during the third incubation. It is suggested that the pesticide was taken up by the algal cells, and were accumulated, detoxified or metabolized.

80-1606. Surovtseva, E. G.; Funtikova, N. S. (Author address not given) **Kometabolizm 3,4-dikloranilina predstavitelyami roda *Pseudomonas.* [Cometabolism of 3,4-dichloroaniline by *Pseudomonas* strains.]** *Mikrobiologiya* 47(1): 21-25; 1978 (12 references) (Russian).

The effects of propanide (propanil), linuron and 3,4-dichloroaniline on soil microorganisms (*Pseudomonas* spp.) were studied. Propanide was decomposed by the soil organisms to yield 3,4-dichloroaniline. 3,4-Dichloroaniline was transformed at a rate of 0-100% during 48 hr. A correlation between this transformation ability and total oxidase activity level was noted. Although all *Pseudomonas* strains used in this study were characterized by low peroxidase activity a strict correlation between its level and the ability to transform 3,4-dichloroaniline was not detected.

80-1607. Lundehn, J. R.; Pestemer, W. (Fachgruppe Chem. Mittelpruefung, Biol. Bundesanst., Braunschweig, BRD) **Zur Rueckstandssituation von Metobromuron (Patoran) in Feldsalat (*Valerianella locusta* L.). [Residues of metobromuron (Patoran) in lamb's lettuce (*Valerianella locusta* L.).]** *Nachrichtenbl. Dtsch. Pflanzenschutzdienstes (Braunschweig)* 30(7): 99-102; 1978 (21 references) (German).

Gas chromatography of Patoran (50% metobromuron) in lamb's lettuce (*Valerianella locusta* L.) carried out at various locations in West Germany disclosed that the maximum permissible level of 1.0 mg/kg was never exceeded. With Patoran used under field conditions, persistence and soil residues were found to depend on the humus content in the soil. Persistence ranged from 27 to 50 days. Soil residues were 0.86-1.68 mg AI/dm³ soil. Photochemical degradation, weather, soil flora and fauna and application method were found to affect the effectiveness of Patoran. The recommended dose is 1.5 kg/ha.

80-1608. Anonymous **Poisoned wells.** *New Sci.* 85(1200): 993; 1980.

A case of aldicarb contamination of drinking water wells on Long Island is reported. The pesticide is used by local potato farmers for the control of colorado potato beetles and golden nematodes. Aldicarb inhibits cholinesterase and can cause problems with muscle coordination in humans. Approximately 25% of the wells tested on Long Island contained more than 7 ppb aldicarb (the maximum safe limit in NY State). Aldicarb degrades quickly, and had not been previously detected in drinking water.

80-1609. Kojima, S.; Fujimoto, H.; Toratani, H. (Osaka Prefect. Cent. Inst. Radiat., Sakai, Osaka, Japan) **[Evaporation of mercury from the solution of water culture to which phenylmercuric acetate has been added.]** *Nippon Dojo-Hiryogaka Zasshi (J. Sci. Soil & Anim. Fert. Jpn.)* 50(6): 523-528; 1979 (17 references) (Japanese).

Phenylmercuric acetate (PMA) was added to rice plant culture solutions and the evaporation of inorganic mercury from the surface of the solution and from the rice plants was traced. PMA was rapidly mineralized in rice plant cultures to inorganic mercury. When 0.25-1.0 ppm PMA was added to rice plant cultures, evaporation of mercury from the leaves or stems of the plants was not observed immediately. After 2-3 days the evaporation was maximum; the cumulative amount of evaporated mercury was 15-53%. In solutions where no rice plants were grown the evaporation of mercury was very small; the greater part of the PMA remained in the solution. When the rice plant roots were washed before the plants were placed in the culture solutions, the onset of mercury evaporation and the time to maximum evaporation were delayed. It was determined that the evaporation of inorganic mercury from the treated rice plant culture solutions was due to symbiotic microorganisms.

80-1610. Kojima, S.; Fujimoto, H.; Toraya, H. (Osaka Prefect. Cent. Inst. Radiat., Sakai, Osaka, Japan) **[Evaporation of mercury from soil of paddy field to which phenylmercuric acetate has been added.]** *Nippon Dojo-Hiryogaka Zasshi (J. Sci. Soil & Anim. Fert. Jpn.)* 50(6): 529-534; 1979 (7 references) (Japanese).

Rice plant stems and leaves absorbed inorganic mercury originating from field applied phenylmercuric acetate (PMA). PMA was observed to yield 3-77 mg inorganic mercury/m³ and > 99% was absorbed by nearby rice plants. Loss of inorganic mercury from the leaves, stems and roots was observed. The total amount of evaporation was increased and the time to maximum evaporation was accelerated by repeated PMA applications. This was suggested to be caused by increased soil bacteria populations resistant to PMA. Aerial concentrations of mercury recorded from September 1975 to March 1976 ranged from < 5 to ~15 ng/m³. No correlation between aerial concentrations of mercury and temperature or temperature-increased microbial activity was observed.

80-1611. Erne, K.; Rutqvist, L. (Fran Statens Veterinarmed. Anst., Stockholm, Sweden) **Pesticidrester i fodermedil i sverige. [Pesticide residues in feed-stuffs in Sweden.]** *Nordisk Veterinaermed.* 31(6): 263-274; 1979 (13 references) (Norwegian).

Samples of feedstuffs prepared in Sweden or imported during 1972-76 were examined for pesticide residues. A total of 278 samples, representing 37 types of feed were studied. Residues of chlorinated hydrocarbon pesticides and of PCBs were looked for in 224 samples. DDT and its transformation products were found in 66 samples; lindane in 44; PCBs in 25; α-BHC in 22; β-BHC in 11 and dieldrin in 9. Pesticides occurred most frequently and at highest levels in feedstuffs of animal origin and in imported oil-feeds. The content of total DDT exceeded maximum limits accepted by the National Swedish Food Administration for grain and bran intended for human consumption. Phenoxy acids were found in only 2 of 63 randomly selected samples.

80-1612. Kempson-Jones, G. F.; Hance, R. J. (Agric. Res. Counc., Weed Res. Org., Yarnton, Oxford OX5 1PF, England) **Kinetics of linuron and metribuzin degradation in soil.** *Pestic. Sci.* 10(6): 449-454; 1979 (21 references).

The disappearance of linuron and metribuzin was studied during laboratory incubation of soil samples which had been taken from several depths at 3 sites and treated with the pesticides. Temperature and water content of the soils were varied. There was a tendency for the rate of loss to be slower in soil taken from deeper horizons than in surface soil, but the differences were not large. In only 10 out of 40 experiments did the value 1 for the apparent order of reaction fall within 95% confidence limits. In the remaining experiments the apparent reaction order was greater than 1 with 8 values higher than 4. For 1 soil, the reaction order for linuron was markedly lower for incubation at 22°C compared with incubations at 10°C. The results could be explained on the basis that the systems were com-

plex, involving consecutive or competing reactions. An alternative possibility is that the apparent complexities were artifacts brought about by the inherent limitations of the laboratory incubation system. (Author abstract by permission)

80-1613. Rouchaud, J.; Moons, C.; Meyer, J. A. (Lab. Phytopathol., Univ. Cathol. Louvain, B-1348 Louvain-la-Neuve, Belgium) **Characterization of bound residues of ^3H triforine in barley grain grown in the field.** *Pestic. Sci.* 10(6): 509-518; 1979 (13 references).

Barley at growth stage J was sprayed with an aqueous emulsion of a mixture of triforine and [^3H] triforine at 250 g/ha. The barley was harvested when ripe, and the grain was analyzed separately. Extraction of the grain with methanol left methanol-insoluble solids containing 75% of the total radioactivity incorporated into the grain. Acidified methanol extracted a further 7% of the triforine-derived bound residues in the form of radioactive iminodiacetic acid (1.1%), glycine (3.3%), serine (0.9%), ethanol amine (0.2%) and unidentified compounds (1.5%); in the grain, these compounds or their precursors had been complexed to grain constituents. Aqueous 0.03 *M* sodium hydroxide extracted a further 27% of the total tritium; acid hydrolysis of the proteins yielded radioactive glycine (9.2%), serine (3.9%) and unidentified compounds (13.9%) which could have been a mixture of a large number of other amino acids. The plant solids (41% of the total tritium) left after the alkaline aqueous extractions were separated into tritiated cellulose (4%) and starch (37%) fractions. [^3H] Glucose was present, having a carbon skeleton mainly originating from some metabolites of [^3H] triforine. (Author abstract by permission, abridged.)

80-1614. Garg, A. K.; Sethi, G. R. (Nucl. Res. Lab., Indian Agric. Res. Inst., New Dehli 110012, India) **Efficient use of insecticides: metabolism of systemic insecticides.** *Pesticides* 13(11): 17-22; 1979 (46 references).

A literature review of systemic carbamate and organophosphate pesticide degradation is presented. The oxidative metabolism of systemic insecticides can result in the formation of toxic metabolites. Hydrolytic breakdown of pesticides, however, results in non-toxic degradation products. Biotransformation, absorption, translocation and metabolism studies in plants, soil and animals are discussed. Soil microorganisms degrade pesticides to generally non-toxic metabolites. It is suggested that extensive studies be performed on the nature and behavior of the pesticides under the various conditions.

80-1615. Thielemann, H. (Lehrstuhl Allg. & Kommunale Hyg., Hyg. Inst., Martin-Luther Univ., Halle-Wittenberg, DDR) **Experimentelle Untersuchungergebnisse zur Frage der Kontamination von Humanmilch mit Gesamt-DDT (DDT + DDE) im Stadtgebiet von Halle (Saale) im Jahre 1978. [Experimental results on the contamination of human milk with total DDT (DDT + DDE) in the city of Halle (Saale) in 1978.]** *Pharmazie* 34(10): 665-666; 1980 (2 references) (German).

In 1978, as in preceding years, 152 individual human milk samples and 85 bulk milk samples (1 sample from an average of 15 women) were analyzed for organochlorine pesticide (DDT + DDE) residues. Samples were taken within the urban confines of the city of Halle/Saale to assess the continuing danger to infants from the persistence of DDT, in spite of the limitation or prohibition of DDT application in East Germany. Of the individual samples 50% were free of contamination. The balance contained 0.05-1.0 ppm DDT. Of the bulk samples 25 were free of contamination, and the remainder contained 0.05-2.0 ppm DDT. It is concluded that the DDT residues in human milk are steadily diminishing.

80-1616. Osawa, T.; Takahashi, K.; Tsuijimura, K. A.; Yamaguchi, R.; Ishikawa, F.; Chiba, K.; Suzuki, N.; Magariya, N. (Sendai Munic. Inst. Public Health, Sendai, Miyagi, Japan) **[On the harmful substances in household furnishings. 4th Report. Dieldrin in textile goods.]** *Sendaishi Eisei Shikensho Shoho (Rep. Sendai Munic. Inst. Public Health)* 8: 208-210; 1978 (4 references) (Japanese).

Articles of clothing and bedding were examined for dieldrin residues in Japan, a year after the implementation of regulations for dieldrin use in the textile industry in 1977. Childrens wear, socks, undergarments, knitting wool and a bed mat were treated with methanol to extract the chemical, the dried residue was dissolved in ether and hexane, and after column cleanup, gas chromatographic analysis was performed. Dieldrin residues ranged from 0.01 to 0.06 ppm in domestic wools, non-detectable (ND) to 0.08 ppm in imported wools, 0.03 to 0.05 ppm in socks, ND to 0.03 ppm in childrens wear, and ND to 0.02 ppm in undergarments. Dieldrin was not detected in the bed mat sample. Recoveries from fortified samples were 92.3%. None of the samples contained dieldrin residues above the allowable limits.

80-1617. Takahashi, K.; Suzuki, N.; Magariya, N. (Sendai Munic. Inst. Public Health Sendai, Miyagi, Japan) **[On the results of determination of pesticides for agricultural use in irrigation water and soil in paddy rice field.]** *Sendaishi Eisei Shikenjo Shoho (Rep. Sendai Munic. Inst. Public Health)* 8: 232-234; 1978 (1 reference) (Japanese).

Residues of organochlorine and organophosphorus pesticides were investigated in 28 samples of irrigation water and 16 paddy rice field soil samples. In irrigation water, 0.0105 μg dieldrin/l were detected in one sample and BHC isomers were found in 17 samples. DDT, its derivatives, and organophosphate

pesticides were not detected in any samples. *p,p'*-DDD (TDE) was detected in 5 soil samples at levels of 0.0026-0.0088 μg/g. Dieldrin was detected in 4 soil samples at levels of 0.0012-0.0098 μg/g. β-BHC was detected in 7 specimens at 0.0008-0.0060 μg/g and γ-BHC (lindane) was detected in 3 samples at 0.0008-0.0120 μg/g. No organophosphates were detected in soil. It is suggested that dieldrin, BHC and DDT will persist at low levels in paddy rice field soils. Irrigation water pollution by these pesticides seems to be negligible, however, it will be necessary to continue to monitor the residue levels in these waters.

80-1618. Hiroshima, K.; Kikuchi, M.; Sugano, T.; Takano, F.; Mishima, Y.; Magariya, N. (Sendai Munic. Inst. Public Health, Sendai, Miyagi, Japan) **[Survey on pesticide residues. 6th report. On organochlorine pesticide residues in vegetables and soils.]** *Sendai-shi Eisei Shikenjo Shoho (Rep. Sendai Munic. Inst. Public Health)* 8: 268-270; 1978 (6 references) (Japanese).

Organochlorine pesticide residues were investigated in 46 vegetable samples, including turnip leaves, Chinese cabbage, burdock, and cucumber collected from the central Sendai wholesale market, and in 20 upland field soil samples in the Sendai suburbs. BHC isomers were detected (up to 0.390 ppm α-BHC) in 8 vegetable samples, particularly in burdock. DDT and its derivatives were detected at low levels in 4 species. Dieldrin was detected in 5 of 8 cucumbers sampled; the high levels were 0.042 and 0.052 ppm. In soil specimens there was a high frequency of detection of α- and β-BHC (β-BHC was found in all samples tested). The frequency of *p,p'*-DDT detection was 90% with one instance of 0.110 ppm. Aldrin was not detected. Dieldrin was detected in 19 of 20 soil samples with high levels of 0.120 and 0.680 ppm. The data were compared to 1972 levels and a general reduction in the amount of organochlorine pesticide residues present was noted. However, levels of BHC isomers in soil were 2 times greater than previously. The soil still contains relatively high levels of these organochlorine pesticide residues indicating a tendency of strong persistence of these pesticides in soils.

80-1619. Gangstad, E. O. (Off. Chief Eng., US Army, Washington, DC) **Herbicide residue of 2,4-D.** *US NTIS AD Rep.* AD-A067,160: 31 pp.; 1978 (66 references).

When a herbicide has entered a body of water it begins to dissipate at a rate affected by the water depth, mean temperature, rate of treatment, and time after treatment. In the case of moving waters, the dissipation rate can also be affected by volume dilution as a function of the surface area to the total area, and the time as a function of the rate of flow. Because of dilution, herbicide residues may be quickly eliminated from water, but residues in the bottom mud may remain for several months or longer depending on the pH of the water, the type of clay and the herbicide used. In addition to dilution, photo, chemical and biological degradation play a large part in herbicide removal. In fact, laboratory studies show that microbial activity is the major factor involved in herbicide degradation. Organic herbicides such as 2,4-D are relatively nontoxic to animals, and when used properly, cause minimum injury to aquatic flora and fauna. Numerous feeding studies show that herbicides are rapidly excreted in body wastes with little or no signs of accumulation in tissue. It follows that fragmentation of the herbicide molecule through metabolism can actually result in detoxification and the formation of utilizable products. In the case of 2,4-D these end products are CO_2, H_2O and a chloride or a terminal residue of a more complex molecule. (Author abstract by permission)

80-1620. Olds, K. L.; Vinopal, J. H.; Suprock, J. F.; White, T. M. (Environ. Hyg. Ag., US Army, Aberdeen Proving Ground, MD) **Department of the Army Pesticide Monitoring Program evaluation of environmental samples collected in calendar year 1976.** *US NTIS AD Rep.* AD-A067,267: 33 pp.; 1979 (1 reference).

Results of the calender year 1976 Department of the Army Pesticide Monitoring Program are presented. Significant findings and conclusions are as follows. Untransformed data should not be relied upon in making statistical comparisons of environmental pesticide residues. The stratified sampling design is adequate to provide an environmental pesticide profile of an installation. Significant differences observed in CY 75 soil data were again evident in CY 76 data. Significant differences observed in CY 75 sediment data were not observed in CY 76 data. Fish exhibit a greater diversity of pesticide residues than corresponding sediment. Statistically significant interactions among the various components were noted with regard to quantitative data. Two years' data did not indicate any significant general trends or patterns of pesticide residues. (Author abstract by permission)

80-1621. Barks, J. H.; Berkas, W. R. (Water Resour. Div., Geol. Surv., Rolla, MO) **Water quality in the proposed Prosperity Reservoir area, Center Creek Basin, Missouri.** *US NTIS AD Rep.* AD-A072,720 31 pp.; 1979 (15 references).

Water in Center Creek basin upstream from the proposed Prosperity Reservoir dam site is a calcium bicarbonate type that is moderately mineralized, hard, and slightly alkaline. Ammonia and organic nitrogen, phosphorus, total organic carbon, chemical oxygen demand, and bacteria increased considerably during storm runoff, probably due to livestock wastes. Nitrogen and phosphorus concentrations are probably high enough to cause the proposed lake to be eutrophic. Minor-element concentrations were at or near background levels in the dissolved, total, and bottom phases. The only pesticides

detected were 0.01 μg/l of 2,4,5-T in one base-flow sample and 0.02-0.04 μg/l of 2,4,5-T and 2,4-D in all storm-runoff samples. Fecal coliform and fecal streptococcus densities ranged from 2-650 and 2-550 colonies/100 ml, respectively, during base flow, but were 17,000-45,000 and 27,000-70,000 colonies/100 ml, respectively, during storm runoff. Water in Center Creek about 2.5 miles downstream from the proposed dam site is similar in quality to that upstream from the dam site except for higher concentrations of sodium, sulfate, chloride, fluoride, nitrogen, and phosphorus. These higher concentrations are caused by fertilizer industry wastes that enter Center Creek about 1.0 mile downstream from the proposed dam site. (Author abstract by permission)

80-1622. Bogdan, D. G. (Lake Champlain Basin Study, Burlington, VT) **The sources and ambient environmental levels of known or potential toxic substances in the Lake Champlain drainage basin.** *US NTIS PS Rep.* PS-79,0976: p. 2; 1979.

No significant metal or toxic substance contamination has been found in fish, sediments, or waters of the Lake Champlain basin. The purposes of this study were to assemble available data on sources and environmental levels of organics and trace metals in the Champlain basin and to evaluate the need for and recommendations for further studies. As development has increased in the lake basin, scientists have been concerned that sewage, industrial waste, and other effluents might have a bad effect on Lake Champlain and its aquatic life. Toxic substances exist in the lake, according to the report, but at present levels they offer no immediate threat to public health and safety. Industrial plants, sewage plants, pest control efforts, and the general growth of man's influence around the shores of the lake are the main sources of the trace metals and other substances of concern. The report recommends that more detailed information be sought by both Vermont and New York State authorities. (Author abstract by permission)

80-1623. Gillett, J. W.; Witt, J. M.; Wyatt, C. J. (Environ. Health Sci. Cent., Oregon State Univ., Corvallis, OR) **Terrestrial microcosms; the proceedings of the workshop on terrestrial microsomes. Symposium on Terrestrial Microcosms and Environmental Chemistry held on June 15-17, 1977.** *US NTIS PS Rep.* PS-79,0976: p. 4; 1979.

The report addresses the task force of the second portion of the Symposium on Terrestrial Microcosms and Environmental Chemistry, organized to provide a state-of-the-art review of terrestrial microcosm technology, to develop a protocol for the application of terrestrial microcosms to the evaluation of pesticides and other toxic substances, and to assess research needs to improve or develop that protocol. Included are the chief characteristics of terrestrial microcosoms used to study the fate and effects of chemicals in the environment, the advantages and limitations of microcosms, the use of microcosms in a hazard evaluation scheme, and the design of terrestrial microcosm systems. The appendices include a microcosm questionnaire designed to identify important issues in microcosm technology a soil core microcosm screening protocol, and a bibliography on terrestrial microcosm technology. (Author abstract by permission)

80-1624. Gen. Account. Off., Washington, DC **Problems in preventing the marketing of raw meat and poultry containing potentially harmful residues.** *US NTIS PS Rep.* PS-79,0976: p. 13; 1979.

GAO estimates that 14% by dressed weight of the meat and poultry sampled by the Department of Agriculture between 1974 and 1976 contained illegal and potentially harmful residues of animal substances drugs, pesticides, or environmental contaminants. Many of these substances are known to cause or are suspected of causing cancer, birth defects, or other toxic effects. Actions taken by the Food and Drug Administration, Environmental Protection Agency, and Department of Agriculture to protect consumers from illegal and potentially harmful residues have not been effective because of the following reasons. The extent of public exposure to illegal residues has not been accurately estimated. Contaminated meat and poultry are generally marketed before the violation is discovered and some cannot be recalled. Efforts to prevent future shipments of meat and poultry containing illegal residues have been inadequate. (Author abstract by permission)

80-1625. Olds, K. L.; Heller, J. M. (Environ. Hyg. Ag., US Army, Aberdeen Proving Ground, MD) **Investigation of possible pesticide residues and toxic effects associated with sleeping bag components.** *US NTIS PS Rep.* PS-79,1029: p. 12; 1979.

Feathers/down used for filling sleeping bags were submitted for pesticide residue determination and skin irritation studies. DDT and DDT metabolites were the only pesticides found. The range was 10.13-1187.12 ppm (ƆDTR). A control sample contained 2.95 ppm DDTR. The levels found are below the recommended treatment levels for this product. No irritation was found as the result of primary skin irritation studies. (Author abstract by permission)

80-1626. Nathans, M. W.; Bechtel, T. J. (Life Environ. Anal. Lab. Div., Richmond, CA) **Availability of sediment-adsorbed selected pesticides to benthos with particular emphasis on deposit-feeding infauna.** *US NTIS PS Rep.* PS-79,1029: p. 17; 1979.

The primary objective was to determine the availability of sediment-associated chlorinated hydrocarbon pesticides to deposit-feeding infauna. This was to include determination of uptake from interstitial water, mineral particulates, and organic detritus as well as an estimate of the degree of bioaccumulation. Results of the study demonstrated that a small fraction of freshly added radiolabeled pesticide was available for uptake by benthic organisms. (Author abstract by permission)

80-1627. Kavalenka, M. A.; Misnik, A. G.; Filipshanava, L. I.; Apanasenka, G. A. (Inst. Microbiol., Byelorussian Acad. Sci., Minsk, USSR) **Uplyv prometrynu i 2M-4X na dykhanne i nitryfikuyutchuyu zdol'nasts tarfyana-balotnai gleby. [Effect of prometryne and MCPA on the respiration and nitrification capacity of peat-bog soil.]** *Vestsi Akad. Navuk B SSR Ser. Biyal. Navuk* (3): 78-80; 1979 (10 references) (Belorussian).

The influence of increasing concentrations of prometryne and MCPA on the biological activity of peat bog soil was investigated. The herbicides were applied to cultured peat bog at concentrations of 3, 27, or 243 mg AI/kg dry soil, followed by wetting and composting at 24°C. Soil respiration was measured 5, 20, and 30 days after application of the pesticides. Prometryne and MCPA did not cause significant depression of the production of CO_2 after 30 days (8.6, 7.8, and 8.5 mg CO_2 produced/100 g soil at doses of 3, 27, and 243 mg AI/kg soil, respectively). Neither herbicide depressed soil nitrification significantly, nor were populations of *Nitrobacter* adversely affected. *Nitrosomonas* populations were significantly depressed during the first 2 wk after prometryne treatment, but this effect was not permanent.

80-1628. Walker, A. (Natl. Veg. Res. Stn., Wellesbourne, Warwick CV35 9EF, England) **Simulation of the persistence of eight soil applied herbicides.** *Weed Res.* 18(5): 305-313; 1978 (13 references).

The effects of soil temperature and soil moisture content on the rates of degradation of simazine, atrazine, propyzamide, linuron, metamitron, trifluralin, metribuzin and chlorthal-dimethyl were measured in a sandy loam soil under controlled laboratory conditions. Atrazine degradation was the least dependent on soil moisture and metamitron degradation the most. Linuron degradation was the least affected by temperature and degradation of chlorthal-dimethyl was the most temperature-dependent. In the field, trifluralin, linuron and chlorthal-dimethyl (DCPA) were the most persistent herbicides with over 40% of the amounts applied remaining 5 mo after application in spring. Simazine and propyzamide were intermediate with residues between 20 and 30% of the initial dose. Atrazine, metamitron and metribuzin were the least persistent with residues generally less than 20% of the amounts present initially. Weather records for the periods of the field experiments were used in conjunction with the appropriate constants derived from the laboratory data in a computer program to simulate persistence in the field. The model predicted with reasonable accuracy the relative order of persistence of the different herbicides, with the exception of metribuzin. With simazine, atrazine, propyzamide and in particular, metribuzin, there was a tendency to underestimate rates of loss. It is suggested that herbicide mobility in the soil was responsible for the poor agreement in some experiments. (Author abstract by permission)

80-1629. Smith, A. E. (Res. Stn., Agric. Canada, Regina, Saskatchewan S4P 3A2, Canada) **Soil persistence experiments with ^{14}C 2,4-D in herbicidal mixtures and field persistence studies with tri-allate and trifluralin both singly and combined.** *Weed Res.* 19(3): 165-170; 1979 (26 references).

The persistence of ^{14}C 2,4-D at a rate equivalent to 1 kg/ha was studied in the laboratory on a heavy clay and a sandy loam at 85% of field capacity and 20°C both alone and in the presence of 1 kg/ha dicamba, dichlorprop, difenzoquat, TCA and 2,4,5-T. The persistence of 2,4,5-T was also monitored in both soils under the same conditions in the presence and absence of ^{14}C 2,4-D. All soils were extracted at weekly intervals using aqueous acidic acetonitrile and analyzed for ^{14}C 2,4-D remaining using radiochemical techniques. The extracts containing 2,4,5-T were additionally analyzed gas chromatographically for that herbicide. In each soil type the half life of the 2,4-D was similar regardless of whether applied singly or in combination with the 5 herbicides tested. Similarly, ^{14}C 2,4-D did not affect the breakdown of 2,4,5-T in either soil type. The persistence of tri-allate (1.5 kg/ha) and trifluralin (0.75 kg/ha) both singly and in combination were compared using small field plots at 2 locations in Saskatchewan. Applications were made during May of 1977 and 1978 and the plots were sampled and analyzed for herbicide(s) remaining after 10 and 20 wk, respectively. The results indicate that within experimental error the loss of both tri-allate and trifluralin from the plots treated with the mixture was the same as from plots treated with the individual compounds. (Author abstract by permission)

80-1630. Hance, R. J.; Embling, S. J. (Weed Res. Organ., Agric. Res. Counc., Begbroke Hill, Yarnton, Oxford OX5 1PF, England) **Effect of soil water content at the time of application on herbicide content in soil solution extracted in a pressure membrane apparatus.** *Weed Res.* 19(3): 201-206; 1979 (15 references).

Wettable powder formulations of simazine, metribuzin and linuron and a suspension concentrate of simazine were sprayed on to soil particles which were either at a water content equivalent to pF 2.5 or air dry. Air dry samples were then wetted to pF 2.5 immediately or after 24 hr. Soil solutions were removed using a pressure membrane apparatus at intervals up to 96 hr after wetting. In each case the concentration in soil solutions expressed after 96

hr following application to wet soil, or dry soil wetted immediately, were close to those predicted on the basis of Freundlich adsorption isotherm data obtained in slurry equilibrium conditions. There were, however, some differences after shorter periods. Concentrations were always lower in solutions obtained from air dry soil that was not wetted for 24 hr. After 96 hr simazine and metribuzin concentrations were about 50% of those obtained following application to wet soil, while that of linuron was about 25%. Differences of this size may be large enough to affect mass transfer phenomena and phytotoxicity. It seems likely that suspension of these herbicides sprayed in formulations on to wet soil dissolved in soil water at least as fast as would be predicted theoretically. (Author abstract by permission)

80-1631. Hamilton, K. C. (Arizona Agric. Exp. Stn., Tucson, AZ 85721) **Persistence of annual applications of herbicides in winter-planted safflower (*Carthamus tinctorius*).** *Weed Sci.* 27(6): 655-657; 1979 (13 references).

To determine pesticide persistence and tendency toward accumulation in cropland diuron [3-(3,4-dichlorophenyl)-1,1-dimethylurea], prometryn [2,4-bis(isopropylamino)-6-(methylthio)-*s*-triazine], and trifluralin (*α,α,α*-trifluoro-2,6-dinitro-*N,N*-dipropyl-*p*-toluidine) were applied preplant in safflower (*Carthamus tincotorius* L. AC-1) for 6 yr at two locations. Diuron and prometryn reduced crop stands in 2 of 6 yr on the sandier soil at Mesa. Growth of sorghum [*Sorghum bicolor* (L.) Moench Amak R-10] in the greenhouse in soil collected 10 mo after each herbicide application was reduced by 1.7 kg/ha of trifluralin in 3 of 6 yr in the Yuma clay loam and by both rates of trifluralin in 1 of 6 yr in the sandier soil at Mesa. Growth of barley (*Hordeum vulgare* L. *Arivat*) was not reduced in soil treated with any herbicide at either location. Herbicides did not accumulate in winter-planted safflower. (Author abstract by permission)

See also 80-1501, 80-1519, 80-1533, 80-1540, 80-1542, 80-1544, 80-1545, 80-1547, 80-1548, 80-1654, 80-1679, 80-1690, 80-1772 *and* 80-1800.

80-1632. Jedrzejowska, H.; Rowinska-Marcinska, K.; Hoppe, B. (Dep. Neurol., Med. Sch., Warsaw, Poland) **Neuropathy due to phytosol (Agritox). Report of a case.** *Acta Neuropathol.* 49(2): 163-168; 1980 (19 references).

A 29-yr-old schizophrenic male drank about 2 glasses of Phytosol (trichloronate) in a suicide attempt. Vomiting occurred immediately. He was admitted to an intensive care unit 10 hr later. Signs of cholinergic crisis occurred, followed 16 days later by peripheral neuropathy and subsequently by the regression of the polyneuropathy with gradually increasing spastic paralegia. Damage to motor nerve fibers was indicated by electrophysiological investigations. No change was noted in maximal motor conduction velocity. Axonal changes were noted in the sural nerve along with demyelination, which was presumed to be secondary in type. It is suggested from this case report that susceptibility to delayed nervous system damage in humans is greater than might be expected from experimental studies. Caution is urged in human exposure to these compounds.

80-1633. Knaak, J. B.; Jackson, T.; Fredrickson, A. S.; Maddy, K. T.; Akesson, N. B. (California Dep. Food & Agric., Sacramento, CA 95814) **Safety effectiveness of pesticide mixing-loading and application equipment used in California in 1976.** *Arch. Environ. Contam. Toxicol.* 9(2): 217-229; 1980 (3 references).

The effectiveness of currently used pesticide mixing-loading and application equipment in preventing workers from being exposed to cholinesterase (ChE) inhibiting pesticides was measured. Blood samples from workers involved in the application of pesticides in Monterey and Imperial counties of California were analyzed for ChE activity. The analyses indicated that only the mean red cell activity of mixer-loaders was significantly less than controls. Seasonal variations in ChE activity were noted for workers in Imperial County between January and August. These variations were apparently related to the toxicity of the pesticides used. A prototype, closed-transfer system used in Imperial County did not substantially reduce pesticide residues in the air around mixing-loading sites or prevent a reduction in ChE activity over that of open-transfer systems. This was attributed to inadequate training in the use of the new equipment on the part of the mixer-loaders and improperly maintained equipment. A prototype closed-transfer system used in Monterey County appeared to give some protection to mixer-loader applicators during the application season; however, the blood ChE activities of 2 mixer-loaders using another prototype closed system in Monterey County were severely depressed. (Author abstract by permission)

80-1634. Singh, S.; Anand, B. S.; Dilawari, J. B. (Dep. Med., Postgrad. Inst. Med. Educ. & Res., Chandigarh, India) **Preliminary observations on acute poisoning in adults.** *Bull. Postgrad. Inst. Med. Educ. Res.* 13(3): 125-130; 1979 (4 references).

In reviewing cases from 66 patients admitted for emergency treatment due to poisoning, the most common poison was organophosphate, which accounted for 22.7% of the cases. Of the total number of cases, 54.5% were suicidal in nature, accidental in 31.3% and undetermined in the remaining 13.7%. Grouped under miscellaneous poisons in this study are naphthalene, diazepam, mercury, and arsenic. Acute poisoning was most common in 20-29 yr olds. It is noted that subjects of upper socio-economic groupings reported for treatment earlier after an episode of acute poisoning than did patients of lower status. Mortality rate was 25.7%.

80-1635. Schmidt-Bleek, F.; Wagenknecht, P. (Author address not given) **Umweltchemikalien. Das Problem der Umweltchemikalien vor der Verabschiedung eines Chemikaliengestzes in der Bundesrepublik Deutschland. [Environmental chemicals: the problems surrounding environmental chemicals prior to the passage of a general chemical product control act in the Federal Republic of Germany.]** *Chemosphere* 8(9): 583-721; 1979 (72 references) (German).

This issue of *Chemosphere* is devoted to a review of past legislation on, and future recommendations for control of, environmental chemical pollutants. The topics covered include environmental protection in the Federal Republic of Germany, a description of environmental chemicals and why they pose problems, legislation for control of chemical products, European Economic Community directives for control of chemical products, toxic substances control regulation in the United States and Japan, considerations for environmental hazard evaluation, testing requirements, evaluation methods and international coordination of test and evaluation methods.

80-1636. Comstock, E. G. (Am. Board Med. Toxicol., Houston, TX) **Pesticides.** *Clin. Toxicol.* 15(4): 485; 1979.

When toxic pesticides are involved, the circumstances must be considered, the clues and/or laboratory steps important in arriving at a diagnosis must be quickly initiated, and therapeutic measures justified on the basis of suspicion should be started. Additional diagnostic considerations under differing circumstances or in other locales, the role and availability of laboratory help, and how to go about getting information concerning products not included in the usual reference sources will be presented. [Presented at the 1979 annual meeting.] (Author abstract by permission)

80-1637. DuToit, P. W.; Mueller, F. O.; VanTonder, W. M. (Dep. Crit. Care, Sch. Med., Univ. Orange Free

State, Bloemfontein, Republic South Africa) **ICU experience with organophosphate poisoning.** *Crit Care Med.* 8(4): 233; 1980.

A study of 157 cases of organophosphate (OP) poisoning from 1975 to 1979 is reported. Forty-one patients of the 157 were admitted to the ICU. Of these, 28 had ingested oxydemeton methyl and 18 were cases of attempted suicide. Serum cholinesterase (ChE) and red blood cell acetylcholinesterase (AChE) activities and clinical parameters were used for diagnosis. Atropine was usually given as therapy; AChE reactivators were given to only 10 patients. Ventilation support was required in 19 cases. A total of 5 (12%) of the patients died. One of these cases was due to massive endogenous OP reintoxication, probably as a result of OP mobilization from lipid after initial recovery.

80-1638. Witt, J. M. (Oregon State Univ., Corvallis, OR 97331) **Alsea study not valid data.** *Farm Chem.* 143(3): 35, 38, 40; 1980.

A critical evaluation is presented of the EPA's 1978 epidemiological study on 2,4,5-T effects in Oregon's Alsea basin. In the study, the hospitalized spontaneous abortion index (HSAI) was determined for an area where the chemical was used in the forests, a rural control area, and an urban control area. From these data it was concluded that it was highly probable that 2,4,5-T was linked to actual human miscarriages. Problems with this conclusion are discussed. Since only hospitalized spontaneous abortions were considered, the variations in medical practices and possible differences in rates of hospitalization between study and control areas are critical factors in determining the effects of 2,4,5-T. It is contended that use of the rural control data, which were not determined in the original study, would measure differences in medical practice rather than 2,4,5-T effects, and that the urban control data produced an artificially deflated abortion rate, and is, therefore, not valid. Examinations of the average number of abortions/mo in 1972-77 indicate that the peak in spontaneous abortions in June actually represents an excess of 1.4 women. All of the excess HSAs, which contribute to this peak, occurred in 1976, while 1973 was the peak year for 2,4,5-T use. The urban control area also showed a similar peak in January, rather than in June. It is concluded that the Alsea data used by the EPA do not support the conclusions that were reached.

80-1639. Hutton, D. G. (Author address not given) **Removal of priority pollutants.** *Ind. Wastes (Chicago)* 26(2): 22, 24, 26; 1980.

A process for removing pollutants from Du Pont's Chambers Works plant in Deepwater, NJ is described. The process calls for the treatment of wastes from organic chemical manufacturing processes by neutralization and settling, followed by a combined powdered carbon-biological process. Specific information is given regarding the removal of both metals and non-metals from the waste water of the plant. Among pesticides listed as priority pollutants are aldrin, dieldrin, chlordane, DDT and its metabolites, endosulfan isomers, endrin, heptachlor, heptachlor epoxide, BHC isomers and toxaphene.

80-1640. Caldwell, S. T.; Sandifer, S. H. (South Carolina Pestic. Epidemiol. Stud. Cent., Div. Prev. Med., Med., Univ. South Carolina, Charleston, SC 29403) **South Carolina pesticide poisonings, 1978.** *J. S. C. Med. Assoc.* 75(12): 615-617; 1979 (6 references).

Surveys were mailed to 1173 physicians engaged in emergency medicine, family or general practice, occupational medicine or pediatrics. Of these, 453 responded to the questionnaire, stating that they had seen or treated 505 cases of pesticide poisoning during the preceeding 12 mo period. The figure indicates that the incidence of pesticide poisonings in South Carolina has changed little over the past surveyed years. The observed rate in response to this survey was 20 cases per 100,000 population, compared to an average of 23 cases per 100,000 population found in the 3 previous studies. It is suggested that this slight decline may be due to a lower response among physicians to the survey than in previous years, or it may in part be due to an increased awareness on the part of the public to the dangers of such chemicals. The enactment of regulations which promote the safe usage and storage of pesticides is also cited as a possible factor in this slight decline.

80-1641. Schuster, H. P. (Med. Univ. Klin. & Poliklin., D-6500 Mainz, BRD) **Akute exogene Intoxikationen und ihre Initialtherapie in der Praxis. [Acute exogenous poisoning and its initial therapy in practice.]** *Med. Welt* 31(3): 117-120; 1980 (German).

Statistical data on the occurrence of acute exogenic intoxications (percentage of all patients brought to emergency wards, types of toxic substances including pesticides, accident site, age group, suicide attempts) are presented. Diagnostic steps to be followed (including inspection of accident site) are discussed. Typical symptoms indicative of such accidents (coma, cramps, arrhythmias, acute renal failure, liver necrosis, gastrointestinal upsets, and skin lesions), first aid measures to be instituted (decontamination, neutralization, and antidotes), induction of vomiting and contraindications are reviewed.

80-1642. Katsenovich, L. A.; Makhmudova, Sh., K. (Dep. Occupat. Dis., Medical Inst., Tashkent, USSR) **O razvitii nekotorykh immunnykh reaktsii pri vozdeistvii khlor- i fosfororganicheskikh pestitsidov na organism. [Development of some immuno reactions after exposure to**

organochlorine and organophosphorous pesticides.] *Med. Zh. Uzb.* (11): 51-54; 1979 (Russian).

The state of antibody-formation was studied in 115 persons who had been occupationally exposed to the pesticides methylmercaptophos (MMP; demeton-o-methyl), hexachlorane (HC; BHC) and DDT. Antibodies to pesticides were recorded in 74.7% of the cases. The incidence of antibodies to HC and DDT was almost 3 times greater than that to MMP. Maximal titers of antibodies to pesticides were recorded in persons who 1-15 days prior to examination had a contact with pesticides. Intensity of antibody-formation showed progressive decrease with the increase of the interval between exposure and examination.

80-1643. Horiuchi, N.; Ando, S.; Kambe, Y. (Saku Gen. Hosp., Usuda, Nagano, Japan) **[Dermatitis due to pesticides for agricultural use.]** *Nippon Hifuka Gakkai Zasshi (Jpn. J. Dermatol.)* 90(3): 277; 1980 (Japanese).

Clinical cases of dermatitis caused by agricultural pesticides were classified into 5 types based on the mechanism of onset. Patch tests with pesticides used the previous year were carried out on 66 greenhouse farmers, 51 vegetable farmers and 25 other patients with pesticide induced dermatitis. Highly positive reactions were noted with dicofol, chlorfenson (ovex) + chlorfenethol, dichlorvos, fenitrothion, salithion, chlorthalonil, zineb, captafol and paraquat.

80-1644. Horiuchi, N.; Ando, S. (Saku Gen. Hosp., Usuda, Nagano, Japan) **[Contact dermatitis due to pesticides for agricultural use.]** *Nippon Hifuka Gakkai Zasshi (Jpn. J. Dermatol.)* 90(3): 289; 1980 (Japanese).

Statistics on patients with dermatitis caused by agricultural pesticides were determined at Saku General Hospital from 1975 to 1978. Of the 88 cases examined, 10 were due to chemical burn, 35 were acute dermatitis, 28 were eczema of the upper extremities and 15 were cases of photosensitized dermatitis. Patch tests carried out on vegetable farmers from Nagano Prefecture revealed that 10-28% of the farmers were sensitive to chlorthalonil, captafol, nicotine sulfate, dichlorvos and maneb. Photosensitizing patch tests revealed light-induced hypersensitization to paraquat, chlorthalonil and dichlorvos.

80-1645. Kusunoki, F. (Engaru Kosei Gen. Hosp., Engaru, Hokkaido, Japan) **[Results of survey on intoxication due to pesticides for agricultural use in Engaru district. Part 3.]** *Nippon Noson Igakkai Zasshi (J. Jpn. Assoc. Rural Med.)* 28(5): 713; 1980 (Japanese).

A survey of pesticide intoxication was performed by medical examination on 185 residents of the Eugaru district. The results were compared to a previous survey. Cholinesterase activity (used as an indicator of toxicity) was reduced in 44.8% of those examined compared to 68.3% in the earlier study. In areas where pesticides were used less, ChE activity was inhibited in only 40.3%.

80-1646. Moraillon, R.; Pinault, L. (Serv. Pathol. Med. Equides & Carnivores, Ec. Natl. Vet., F-94701 Maisons-Alfort, France) **Diagnostic et traitement d'intoxications courantes des carnivoires. [Diagnosis and treatment of common intoxications in carnivores.]** *Recl. Med. Vet.* 154(2): 137-150; 1978 (French).

Intoxication symptoms caused by organophosphorus, organochlorine and carbamate insecticides, metaldehyde, rodenticides (crimidine, chloralose, ANTU, thallium and warfarin), ethylene glycol and arsenic in domestic pets are reviewed. Types of samples required for diagnosis and a method for determining cholinesterase activity are tabulated. Recommendations for treatment of intoxication by the different compounds are individually presented.

80-1647. US EPA, Washington, DC **Ambient water quality criteria: aldrin/dieldrin.** *US NTIS PB Rep.* PB-297,916: 147 pp.; 1978 (188 references).

Section 304(a) of the Clean Water Act requires EPA to publish and periodically update water quality criteria. These criteria are to reflect the latest scientific knowledge on the identifiable effects of pollutants on public health and welfare, aquatic life, and recreation. This report present water quality criteria for aldrin and dieldrin. It presents concentration criteria for the protection of fresh water and salt water aquatic life. It present safe concentrations for humans, and in the case of suspect or proven carcinogens, gives various levels of incremental cancer risk. A section 304(a) water quality criterion is a qualitative or quantitative estimate of the concentration of a water constituent or pollutant in ambient waters which, when not exceeded, will ensure a water quality sufficient to protect a specified water use. Under the Act a criterion is a scientific entity, based solely on data and scientific judgement. It does not reflect considerations of economic or technological feasibility nor is it a water quality standard and in itself has no regulatory effect. (Author abstract by permission)

80-1648. US EPA, Washington, DC **Ambient water quality criteria: DDT.** *US NTIS PB Rep.* PB-297,923: 171 pp.; 1978 (241 references).

Section 304(a) of the Clean Water Act [33 U.S.C. 1314(a)], requires EPA to publish and periodically update water quality criteria. These criteria are to reflect the latest scientific knowledge on the identifiable effects of pollutants on public health and welfare, aquatic life, and recreation. This report presents water quality criteria for

DDT. It presents concentration criteria for the protection of fresh water and salt water aquatic life. It presents safe concentrations for humans, and in the case of suspect or proven carcinogens, gives various levels of incremental cancer risk. A section 304(a) water quality criterion is a qualitative or quantitative estimate of the concentration of a water constituent or pollutant in ambient waters which, when not exceeded, will ensure a water quality sufficient to protect a specified water use. Under the Act a criterion is a scientific entity, based solely on data and scientific judgement. It does not reflect considerations of economic or technological feasibility nor is it a water quality standard and in itself has no regulatory effect. (Author abstract by permission)

80-1649. US EPA, Washington, DC **Ambient water quality criteria: hexachlorocyclohexane.** *US NTIS PB Rep.* PB-297,924: 107 pp.; 1978 (139 references).

Section 304(a) of the Clean Water Act requires EPA to publish and periodically update water quality criteria. These criteria are to reflect the latest scientific knowledge on the identifiable effects of pollutants on public health and welfare, aquatic life and recreation. This report presents water quality criteria for hexachlorocyclohexane (BHC). It presents concentration criteria for the protection of fresh water and salt water aquatic life. It presents safe concentrations for humans, and in the case of suspect or proven carcinogens, gives various levels of incremental cancer risk. A section 304(a) water quality criterion is a qualitative or quantitative estimate of the concentration of a water constituent or pollutant in ambient waters which, when not exceeded, will ensure a water quality sufficient to protect a specified water use. Under the Act a criterion is a scientific entity, based solely on data and scientific judgement. It does not reflect considerations of economic or technological feasibility nor is it a water quality standard and in itself has no regulatory effect. (Author abstract by permission)

80-1650. US EPA, Washington, DC **Ambient water quality criteria: mercury.** *US NTIS PB Rep.* PB-297,925: 217 pp.; 1978 (357 references).

Section 304(a) of the Clean Water Act [33 U.S.C. 1314 (a)], requires EPA to publish and periodically update water quality criteria. These criteria are to reflect the latest scientific knowledge on the identifiable effects of pollutants on public health and welfare, aquatic life, and recreation. This report presents water quality criteria for mercury. It presents concentration criteria for the protection of fresh water and salt water aquatic life. It presents safe concentrations for humans, and in the case of suspect or proven carcinogens, gives various levels of incremental cancer risk. A section 304(a) water quality criterion is a qualitative or quantitative estimate of the concentration of a water constituent or pollutant in ambient waters which, when not exceeded, will ensure a water quality sufficient to protect a specific water use. Under the Act a criterion is a scientific entity, based solely on data and scientific judgement. It does not reflect considerations of economic or technological feasibility nor is it a water quality standard and in itself has no regulatory effect. (Author abstract by permission)

80-1651. Sobleman, M.; Sweeny, K. H.; Calimag, E. D. (Montrose Chem. Corp., Torrance, CA) **Development of a DDT manufacturing and processing plant waste treatment systems.** *US NTIS PS Rep.* PS-79,1029: p. 14; 1979.

The report gives results of a study both to test the feasibility of detoxification of DDT manufacturing wastes, using solvent extraction, and to develop a practical process if possible. Three different liquid-liquid contacting devices were tested: all provided reasonably good extraction of DDT and homologs from the caustic aqueous phase. Unfortunately, major phase separation problems resulted in excessive losses of monochlorobenzene solvent to the aqueous phase. Efforts to improve coalescence/phase separation were unsuccessful. Further development of a solvent extraction process for detoxification of DDT manufacturing waste cannot be justified. (Author abstract by permission)

80-1652. Gen. Account. Off., Washington, DC **Special pesticide registration by the Environmental Protection Agency should be improved.** *US NTIS PS Rep.* PS-79,1029: p. 17; 1979.

This report discusses the Environmental Protection Agency's program to regulate pesticides that are used for experimental and emergency purposes or that are registered by the states to meet special local needs. This report's contents are as follows: experimental use permit program is not effective; inefficiencies in administering emergency exemptions; need to improve state pesticide registration program; the DDT emergency exemption for Douglas-fir tussock moth control, a case history. (Author abstract by permission)

80-1653. Anonymous; Armstrong, J.; Barry, J.; Bergen, J.; Miller, I.; Shea, P. (Aerial Appl. Technol. Workgroup, Equip. Dev. Cent., For. Serv., USDA, Missoula, MT 59801) **Forest and range aerial application technology: a problem analysis.** *USDA For. Serv. Rep.* July: 106 pp.; 1979.

Aerial application of pesticides is a tool for insect, disease and vegetative management in forests. Ten problem areas associated with this practice were identified; approaches to solutions and specific actions for each are recommended. Aircraft delivery systems, aircraft guidance, application strategy, biological interface,

meteorology, pesticide safety, spray behavior, spray drift, spray sampling and technology transfer are examined in detail. Each area is divided into several subproblems and the background, solutions and recommended actions are listed for each subproblem. Drift reduction, application cost reduction and improved control effectiveness are defined as the areas with top priority. The appendices cover the state of the art of aerial application, an overview of aerial pesticide application and current research and development in the field.

80-1654. Siegert, M. (Author address not given) **Zur Reinigung PSM-haltiger Abwasser. [Purification of pesticide-containing wastewaters.]** *Wasserwirtsch. Wassertech.* 29(11): 372-373; 1979 (German).

Methods of decontamination of waste waters containing pesticides are discussed. Soil decomposition of pesticides after spraying contaminated waters over cultivated land or wasteland is not considered viable because of potential ground water contamination. Some pesticide-polluted waters can be decontaminated in biological purification plants, but those containing triazines, chlorinated hydrocarbons and carbamates cannot. The binding of pesticides in waste waters to power industry waste products such as ash is suggested as a feasible method. Electrofilter ash is used for flocculation, wet ash for adsorption. This method can be used successfully to decontaminate waters containing toxaphene, dithiocarbamate and phenoxyalkylacids, but additional analytical studies are needed to determine whether such purified waters contain decomposition products potentially more harmful than the original pesticides.

80-1655. Huvar, A. J.; Dreger, R. H. (Mobil Chem. Co., Richmond, VA) **Bifenox (Modown) herbicide label additions for 1978.** *Weed Sci. Soc. Am. Meeting:* p. 90; 1978.

Federal registration information for the herbicide bifenox is listed. When bifenox was first introduced in 1975, its federal registration was for use on soybeans to control certain broadleaf weeds. State registrations were also issued in Texas, Mississippi and Arkansas for use as a preemergence treatment on dry planted rice and in Texas for grain sorghum. The registration label includes the use of bifenox preemergence on pine nursery seed beds in Southeastern United States, on loblolly, slash, short leaf, long leaf and white pines, pre- and post-emergence on rice, pre-emergence on grain sorghum and post-emergence on wheat.

See also 80-1516, 80-1533, 80-1542, 80-1544, 80-1545, 80-1547, 80-1587, 80-1624, 80-1692, 80-1694 *and* 80-1713.

80-1656. Durward, Q. J.; Cohen, M. M.; Naiman, S. C. (Dep. Surg., Univ. British Columbia, Vancouver Gen. Hosp., Vancouver, British Columbia, Canada) **Intramural hematoma of the gastric cardia.** *Am. J. Gastroenterol.* 71(3): 301-305; 1979 (12 references).

A case of intramural hematoma of the gastric cardia occurring in a 21-yr-old female is described. Past history included 3 episodes of deep venous thrombosis during the past year, with positive antinuclear factor, lupus erythromasus (LE) cells, and high DNA antibody titer. She was taking 2.5 mg/day doses of warfarin. An upper GI series and gastroscopy indicated the presence of a large lesion arising from the upper curvature of the cardiac stomach. It was concluded that the underlying cause precipitating the spontaneous hematoma was the warfarin therapy.

80-1657. Cresteil, T.; LeRoux, P. (Lab. Biochim., INSERM U75, CHU Necker Enfants Mal., F-75730 Paris Cedex 15, France) **Developpement du systeme monooxygenasique. Implications en pharmacotoxicologie perinatale. [Development of the mono-oxygenase system. Implications in perinatal pharmacotoxicology.]** *Ann. Biol. Clin. (Paris)* 38(1): 57-65; 1980 (105 references) (French).

Monoxygenases are part of the overall system of detoxification of xenobiotics which they help deactivate; the metabolites are subsequently eliminated through the urinary and biliary tract. While the metabolites are normally eliminated, the intake of certain drugs and exposure to organic environmental pollutants can result in the formation of toxic metabolites in the fetus because their transport through the placenta is faster than their reverse flow. Literature dealing with the development of the monooxygenase system mediating the metabolism of xenobiotics and steroids and microsomal enzymatic activities of phase II (epoxide hydrolase and UDP-glucuronosyl-transferase) in laboratory animals and in the human fetus and the effect of exogenic inducers (such as heptachlor, chlordane and parathion) and endogenic hormones on these activities are reviewed.

80-1658. Carricaburu, P.; Lacroix, R.; Lacroix, J. (Dep. Human Physiol., Med. Fac. Paris-Ouest, F-75270 Paris, France) **Action differentielle d'un pesticide anticholinesterasique, le carbaryl (N-methyl carbamate de naphtyle), sur les systemes photopique et scotopique de la Souris blanche. [Differential action of carbaryl on the photopic and scotopic systems of the white mouse.]** *Ann. Pharm. Fr.* 37(9-10): 445-449; 1979 (7 references) (French).

Electroretinograms (ERG) of mice administered 250 mg/kg ip doses of carbaryl were recorded subsequent to stimuli given to the animals by an electronic flash. Photopic (red), or mixed photopic-scotopic (blue) responses were obtained by using red or blue filters. The latency of photopic *a*-waves increased more rapidly than that of scotopic *a*-waves, the latencies of *b*-waves of both systems increased equally, and the amplitudes of photopic *b*-waves decreased more rapidly during carbaryl treatment. Although carbaryl may affect the synaptic transmission of both systems equally, cones rather than rods are seemingly more affected. The photopic system is more rapidly and more profoundly affected than the scotopic system.

80-1659. Al-Badry, M. S.; Knowles, C. O. (Dep. Entomol., Univ. Missouri, Columbia, MO 65211) **Phthalate-organophosphate interactions: toxicity, penetration, and metabolism studies with house flies.** *Arch. Environ. Contam. Toxicol.* 9(2): 147-161; 1980 (20 references).

Seventeen phthalates were not toxic to female house flies, *Musca domestica* L., when applied at high dosages topically or by injection. An antagonistic interaction was observed upon simultaneous application of di-2-ethylhexyl phthalate (DEHP; dioctyl phthalate) or di-*n*-butyl phthalate (dibutyl phthalate) with 21 organophosphates. However, a synergistic interaction was apparent when house flies were pretreated with DEHP by topical application or injection 30 min prior to topical application of organophosphates. Penetration and *in vivo* and *in vitro* metabolism studies using DEHP and chlorpyrifos (*O,O*-diethyl *O*-(3,5,6-trichloro-2-pyridinyl) phosphorothioate) as model compounds indicated that DEHP, when applied topically to house flies, penetrated extremely slowly and was metabolized very slowly. DEHP also was shown to exert an inhibitory effect on chlorpyrifos metabolism *in vitro* and *in vivo*. Chlorpyrifos alone penetrated extremely rapidly and was rapidly metabolized. The antagonistic interaction may be due at least in part to the fact that both DEHP and chlorpyrifos are lipophilic, and the increase in the total lipophilic pool by the DEHP resulted in internal levels of toxicant below the toxicity threshold. A plausible explantation for the synergistic interaction is as follows. Chlorpyrifos penetrated slowly in DEHP pretreated house flies; however, the rate was not as slow as that observed when the two compounds were applied simultaneously. This coupled with the inhibition of chlorpyrifos metabolism by DEHP permitted a slow but lethal accumulation of toxicant. (Author abstract by permission)

80-1660. Rup Lal; Saxena, D. M. (Dep. Zool., Univ. Delhi, Delhi 110007, India) **Effect of DDT on cell population growth, cell division, and DNA synthesis in *Stylonychia notophora* (Stokes).** *Arch. Environ. Contam. Toxicol.* 9(2): 163-170; 1980 (28 references).

The effect of DDT on growth and DNA synthesis in *Stylonychia notophora* was investigated. DDT at a concentration of 1 ppm did not alter the cell population growth and the morphology of the organisms. However, 50 and

100 ppm DDT inhibited growth and cell division. Continuous treatment of the organisms with 100 ppm DDT produced several nuclear abnormalities. Cells treated with 100 ppm DDT in G_1 did not enter S-phase while DNA synthesis was blocked in those cells treated in S-phase. (Author abstract by permission)

80-1661. Olson, K. L.; Matsumura, F.; Boush, G. M. (Dep. Entomol., Univ. Wisconsin, Madison, WI 53706) **Behavioral effects on juvenile rats from perinatal exposure to low levels of toxaphene, and its toxic components, toxicant A, and toxicant B.** *Arch. Environ. Contam. Toxicol.* 9(2): 247-257; 1980 (20 references).

Behavioral effects of toxaphene, and its toxic components, toxicant A and toxicant B, were studied by perinatally exposing juvenile rats. Toxaphene was given daily to pregnant rats (and their offspring) at 50 μg/kg body wt via their diet. The daily dietary levels of toxicants A and B were 2.0 μg/kg body wt. Behavioral tests were performed on the offspring. All rats fed toxaphene, as well as toxicants A and B, showed retarded maturation as judged by the swimming test during their early development. However, the treated rats eventually attained normal swimming ability. The maze retention test demonstrated significant differences between the toxicant A group and all other groups. The toxicant A animals had no difficulty in learning the test problems but were inferior to the other groups in retaining that knowledge. (Author abstract by permission)

80-1662. Guillot, M.; Toubas, P. L.; Mselati, J. C.; Gamarra, E.; Moriette, G.; Relier, J. P. (Cent. Rech. Biol. Dev. Foetal & Neonatal, Hop. Port-Royal, F-l75014 Paris, France) **Embryo-foetopathie Coumarinique et maladie des epiphyses ponctuees. [Coumarin-induced embryofetopathies and chondrodysplasia punctuata.]** *Arch. Fr. Pediatr.* 36: 63-66; 1979 (11 references) (French).

A case study of a newborn female with teratogenic abnormalities following anticoagulant treatment of the mother with daily doses of nitrophenylacetylethyl-4-hydroxycoumarin (Sintrom) is described. The newborn was delivered by caesarian section at wk 30 of gestation, and was diagnosed to suffer from microcephaly, facial abnormalities with hypoplasia of the nasal structures, and split and detached calcanean epiphyses. At 2 mo of age *post partum*, extensive axial hypotonia and psychomotor retardation were evident. The teratogenic effects of coumarin anticoagulants (warfarin) have been recently documented by a study of 115 women who took coumarin derivatives during their pregnancies. Nearly 29% of the neonates were found to be abnormal, including dysmorphic syndrome (13.9%), fetal deaths *in utero* (13%), and neonatal hemorrhage syndrome (1.8%). Since coumarin-derived substances can cross the placenta, it is suggested that anticoagulant therapy be altered or stopped during early pregnancy.

80-1663. Braeckman, R. A.; Godefroot, M. G.; Blondeel, G. M.; Belpaire, F. M.; Willems, J. L. (Heymans Inst. Pharmacol., Med. Sch., Univ. Gent, B-9000 Gent, Belgium) **Kinetic analysis of the fate of methyl parathion in the dog.** *Arch. Toxicol.* 43(4): 263-271; 1980 (20 references).

Methyl parathion (1, 3, 10 and 30 mg/kg) was injected iv in dogs and the serum concentrations were followed as a function of time. For each dose the serum level data were fitted to a two- or tri-exponential equation by means of a non-linear least-squares regression analysis computer program. During the first hours after injection a rapid and important decrease of the serum levels was observed, whereas afterwards the levels decreased more slowly with a harmonic mean terminal half-life of 7.2 hr (range 6.6 to 8.8 hr) for the 10 mg/kg dose. Simulations using the kinetic parameters obtained for the dose of 10 mg/kg show that elimination of methyl parathion from the body is fast (5 hr after injection only 30% of the dose is still present in the body) and that the fraction remaining is mainly located in the peripheral compartments. (Author abstract by permission)

80-1664. Vasilescu, C.; Florescu, A. (Inst. Neurol. & Psychiatr., Acad. Sci., R-75622 Bucharest, Romania) **Clinical and electrophysiological study of neuropathy after organophosphorus compounds poisoning.** *Arch. Toxicol.* 43(4): 305-315; 1980 (21 references).

Clinical and electrophysiological examinations were performed on 12 patients with toxic neuropathy following accidental ingestion of alcohol polluted by tri-*o*-cresyl phosphate (TOCP). Concurrent PNS and CNS lesions were found in all patients. Two or 3 mo after ingestion, 5 of them showed prevalent signs of mixed, sensorimotor polyneuropathy, especially motor and distal, and the electrophysiological data pointed to the mixed process of axonal degeneration and secondary demyelination. In 2 of these 5 patients in whom examinations were repeated 13 yr after TOCP ingestion, there was a marked clinical and electrophysiological improvement of signs of PNS lesions. Improvement of signs of CNS lesions was very poor even after 13 yr. Signs of CNS lesions prevailed in the remaining 7 patients. The clinical picture resembled that in amyotrophic lateral sclerosis and the electrophysiological data suggested a neuronal and axonal degeneration. Apart from the 12 cases of TOCP neuropathy, we also studied 2 cases of poisoning with organophosphorus insecticides, Dipterex (trichlorfon) and Divipan (dichlorvos), in which a pure motor form of neuropathy was found. (Author abstract by permission)

80-1665. Maksimovic, M. (Army Tech. Inst., Belgrade, Yugoslavia) **Oksimi HI-6 i PAM-Cl: uporedna farmakokineticka ispitivanja posle intramuskularnog i oralnog apliciranja pacovima. [Oximes HI-6 and PAM-Cl:**

comparative pharmacokinetic studies after intramuscular and oral administration to the rat.] *Arh. Hig. Rada Toksikol.* 30(3): 227-239; 1979 (21 references) (Serbo-Croatian).

In pharmacokinetic studies on organophosphate antidotes, rats were treated im and po with oximes HI-6 and PAM-Cl. After im administration, blood levels of HI-6 were found to be dose-related, with doses of 10, 20, 30, and 50 mg HI-6/kg producing concentrations of 20.2, 39.1, 48.5 and 78.6 μg/ml, respectively. IM doses of 20 and 50 mg PAM-Cl/kg resulted in plasma concentrations of 17.1 and 42.7 μg/ml, respectively. Half-times for oxime elimination from the blood were calculated to be 26.8 min for HI-6 and 18.4 min for PAM-Cl, and first order kinetics for elimination were assumed to be involved since an increase in the dose did not increase the half-time. HI-6 apparently diffuses through membranes or into tissues more slowly than PAM-Cl, since the volume of distribution for PAM-Cl was 4-5 times larger than for HI-6. The biological half-life, which was calculated from blood plasma values after oral administration of 200 mg/kg, was 101.9 min for HI-6 and 180.5 min for PAM-Cl. After oral administration, the maximum concentration of HI-6 in plasma was about 11 μg/ml.

80-1666. Hart, R. J.; Cavey, W. A.; Moore, B.; Strong, M. B. (Ciba-Geigy Res. Cent., Kemps Creek, New South Wales, Australia) **Efficiency and safety of methidathion applied as a pour-on systemic insecticide for control of cattle lice.** *Aust. Vet. J.* 55(12): 575-579; 1979 (11 references).

To test the safety of the insecticide methidathion 2.5-6.0 mg/kg concentrations of the pour-on formulation (containing 8% w/v methidathion) were applied to cattle. Fifteen 20-day-old calves tolerated methidathion concentrations 7-fold the recommended 4 mg/kg dose, but 1 of 4 calves died after treatment with 50 mg/kg. Treatments with 50 mg/kg methidathion, 50 mg/kg fenthion, 75 mg/kg famphur (ENT-25644), and 85 mg/kg chlorpyrifos reduced whole blood cholinesterase activities of the cattle by 55, 52, 27, and 47%, respectively. Two-day-old calves were found to be 4 times as sensitive to methidathione treatments as 16 day old animals. Field treatment with methidathion of 11,900 cattle at rates of 4-8 mg/kg and 534 cattle at 24 mg/kg resulted in no observed signs of toxicity.

80-1667. Cutkomp, L. K.; Sudershan, P.; Khan, H. (Dep. Entomol. Fish. & Wildl., Univ. Minnesota, St. Paul, MN 55108) **Effects of two biodegradable 1,1,1-trichloro-2,2-*bis* (*p*-chlorophenyl)ethane (DDT) analogs on cockroach ATPases.** *Biochem. Pharmacol.* 29(7): 1065-1067; 1980 (21 references).

ATPase enzyme preparations from the muscles and brains of male American cockroaches were reacted with 1 μl samples of 0.25-33 μ*M* concentrations of the DDT analogs 1,1-*bis* (*p*-ethoxyphenyl)- 2-chloropropane (compound A) and 1,1-*bis* (*p*-ethoxyphenyl)-2- methylpropane (compound B). Inhibition of enzyme activity was determined at pH 8.5, an optimum for Mg^{2+} ATPase. Both DDT analogs reduced the specific activity of oligomycin sensitive (o-s) Mg^{2+} ATPase in the homogenates. In brain homogenates 50% reductions in ATPase activity were obtained with 6.7 μ*M* concentrations of compound A and 9.7 μ*M* concentrations of compound B. Oligomycin insensitive Mg^{2+} ATPase from muscle was far less sensitive to either compound than o-s Mg^{2+} ATPase.

80-1668. Evreinov, V. I.; Semenova, V. N.; Godovikov, N. N.; Kabachnik, M. I. (Inst. Org. Elem. Compd., Acad. Sci., Moscow, USSR) **Opredelenie srodstva nekotorykh fosfororganicheskikh ingibitorov k aktivnomu tsentru kholinesteraz kineticheskim metodom i metodom fluorestsentnogo zonda. [Determination of some organophosphorus inhibitor affinities from the active site of cholinesterases by kinetic and fluorescent-probe methods.]** *Bioorg. Khim.* 5(8): 1233-1242; 1979 (21 references) (Russian).

Methods for determining the affinities of irreversible organophosphorus inhibitors for the active sites of cholinesterases were investigated. Four thioesters of phosphoric acids were found to competitively displace the highly specific fluorescent probe *N*-methylacridinium. The dissociation constants of reversible enzyme-inhibitor complexes determined by the fluorescent probe and by kinetic methods were generally in good agreement.

80-1669. Manzini, G.; Ciana, A.; Crescenzi, V. (Ist. Chim., Univ. Trieste, Trieste, Italy) **The interaction of serum albumins with various drugs in aqueous solution. Gel permeation, calorimetric, and fluorescence data.** *Biophys. Chem.* 10(3-4): 389-396; 1979 (12 references).

Gel permeation chromatography and microcalorimetric measurements were used to study thermodynamic data concerned with the reversible interaction between human or bovine serum albumin and organic ligands including S- and R-warfarin, d-oxazepam hemisuccinate, l-oxazepam hemisuccinate, phenylbutazone, and fluoresceine. The results of the study indicate that affinity varies from one ligand to another, but for each given ligand the results are nearly identical for both human and bovine serum albumin. Binding of the drugs considered by either human or bovine serum albumin was not a simple polyelectrolytic effect. The findings suggest that S-warfarin would bind to homologous primary sites of both human and bovine serum albumin. While the situation with R-warfarin is less clear, it appears probable that the ligand has the same primary site on each protein.

80-1670. Cantino, D.; Mosso, R.; Baccino, F. M. (Ist. Istol. & Embriol. Gen., Univ. Torino, Turin, Italy)

Changes induced by fasting and cycloheximide in the vacuolar apparatus of rat hepatocytes. A morphometric investigation. *Boll. Soc. Ital. Biol. Sper.* 55(18): 1884-1889; 1979 (4 references).

Male Wistar rats were treated every 6th hour with 4 ip doses of cycloheximide at 1.1 mg/kg. They were sacrificed 6 hr after the last injection. Both the treated and the control animals were fasted for 24 hr with free access to water. Non-treated animals showed an increase in the number of autophagic vacuoles. This was not noted in the cycloheximide-treated animals. The frequency of residual bodies was diminished in treated as compared to non-treated animals. The total lysosomal population was increased in treated animals due to an augmented number of dense bodies. These results support the view that cycloheximide inhibits the effects of fasting on liver protein catabolism by impairing the autophagic processes.

80-1671. Routledge, P. A.; Chapman, P. H.; Davies, D. M.; Rawlins, M. D. (Dep. Pharmacol. Sci., Wolfson Unit Clin. Pharmacol., Univ Newcastle upon Tyne, Newcastle upon Tyne NE1 7RU, England) **Pharmacokinetics and pharmacodynamics of warfarin at steady-state.** *Br. J. Clin. Pharmacol.* 8(3): 243-247; 1979 (18 references).

Fifteen patients undergoing withdrawal from warfarin therapy were studied. The total plasma clearance was correlated to a significant degree with the free fraction in plasma. An age related decline in the dose of warfarin and in the total and free plasma warfarin concentrations required to produce the same anticoagulant effect was noted. However, it was also determined that neither total nor free plasma warfarin clearances varied with age. In individual patients the log concentration-effect relationships were linear above a prothrombin ratio of 1.2. There was also a significant correlation between the slope and the free fraction of warfarin in plasma. It is possible that plasma protein binding may reflect the interaction between warfarin and its effector site in the hepatocyte.

80-1672. Danesi, M. A. (Tech. Hosp., Lagos Univ., Lagos, Nigeria) **Total resistance to oral anticoagulants (nicoumalone and warfarin).** *Br. J. Clin. Pract.* 34(2): 55, 64; 1980 (2 references).

A case of resistance to the anti-coagulants heparin and warfarin are described. A 48-yr-old housewife was given 10,000 units of heparin and 30 mg warfarin following the appearance of Homan's Sign post-operatively. Initial prothrombin response was followed by absolute resistance (refractoriness) to the oral anti-coagulants.

80-1673. Viamonte, M.; Amazon, K.; Rywlin, A. M. (Dep. Pathol., Mount Sinai Med. Cent. Greater Miami, Miami Beach, FL) **Hemorrhagic necrosis of the breast associated with anticoagulant (sodium warfarin) therapy.** *Breast* 6(1): 19-21; 1980 (13 references).

A 62-yr-old woman with arteriosclerotic heart disease, diabetes mellitus, and past episodes of pulmonary edema was hospitalized for a triple coronary bypass and mitral valve replacement. Sodium warfarin, 10 mg twice daily for 4 days, was started 3 days postoperatively. A painful purple discoloration appeared on the left breast 1 day after the anticoagulant therapy ended. Prothrombin time was 38/11 and platelets were within normal range. The discoloration spread over 75% of the breast surface and a xeromammogram showed edema. A simple mastectomy was performed and the patient recovered uneventfully. Study of the removed tissue showed that the entire breast parenchyma demonstrated hemorrhage and necrosis. It is noted that the course of hemorrhagic necrosis is not affected by discontinuance of the anticoagulant. For small lesions it is suggested that they usually resolve spontaneously and surgical intervention is not required.

80-1674. Murray, H. E.; Guthrie, R. K. (Univ. Texas Health Sci. Cent., Houston Sch. Public Health, Houston, TX 77025) **Effects of carbaryl, diazinon and malathion on native aquatic populations of microorganisms.** *Bull. Environ. Contam. Toxicol.* 24(4): 535-542; 1980 (13 references).

The effects of carbaryl, diazinon and malathion on indigenous aquatic organisms were studied in water samples collected from Lake Houston. Water treated with 5 mg/l carbaryl exhibited significantly increased bacterial counts and decreased dissolved oxygen levels during the first 3-5 day period. After 5 days bacterial counts returned to control levels. Dissolved oxygen levels were equal to control levels after day 7. Increased Chrysophyta numbers were observed after treatment of test waters with malathion and diazinon. However, Crysophyta were significantly greater in control aquaria than in treated waters by day 7. Malathion at 5 mg/l caused a slight increase in BOD in the lake water, but there was not significant change in the direct algal counts or in bacterial plate counts. It is concluded that the eutrophication process which would require an entire season for completion with no artificial stimulation may be repeated when a pesticide is added to the surface water.

80-1675. Stratton, G. W.; Burrell, R. E.; Kurp, M. L.; Corke, C. T. (Dep. Environ. Biol., Univ. Guelph, Guelph, Ontario N1G 2W1, Canada) **Interactions between the solvent acetone and the pyrethroid insecticide permethrin on activities of the blue-green alga *Anabaena*.** *Bull. Environ. Contam. Toxicol.* 24(4): 562-569; 1980 (12 references).

The interactions of acetone with the toxicity of the pyrethroid insecticide permethrin were studied. Photosynthetic activity of *Anabena inaequalis* was stimulated by acetone at concentrations of 0.1 or 0.4%. Photosynthesis

in *A. variabilis* was significantly stimulated by acetone concentrations below 1%. No significant stimulation of CO_2 uptake was noted with *A. cylindrica*, and inhibition was noted above 0.6% acetone. Inhibition was 75% at 0.8% acetone and 95% at 1.0% acetone. *A. inaequalis* exhibited an additive response to the inhibitory effects of permethrin and acetone stimulation. The effects of acetone and permethrin interactions on the photosynthesis of *A. cylindrica* were more complex. Interaction was additive at 0.1, 0.2 and 0.8%, showed antagonism at 0.4 and 0.6%, and exhibited synergism at above 0.8% acetone. In studies with *A. variabilis* permethrin and acetone interacted in an additive manner at 0.1, 0.2 and 0.8% acetone and exhibited antagonism at all other levels assayed. It is concluded that care must be taken when dealing with the environmental toxicity testing of water-insoluble pesticides. The solvent itself may be extremely harmful to a particular organism, or may interact with the test compound. The solvent sensitivity of each organism to be tested should be determined.

80-1676. McLeese, D. W.; Sergeant, D. B.; Metcalfe, C. D.; Zitko, V.; Burridge, L. E. (Biol. Stn., Dep. Fish. & Oceans, Fish. & Environ. Sci., St. Andrews, New Brunswick EOG 2XO, Canada) **Uptake and excretion of aminocarb, nonylphenol, and pesticide dilutent 585 by mussels (*Mytilus edulis*).** *Bull. Environ. Contam. Toxicol.* 24(4): 575-581; 1980 (12 references).

Mussels with valve lengths of about 5.0 cm were exposed in static tests at 15°C to aminocarb at concentrations of 0.352 or 0.403 mg/l of sea water for periods of 4 days. Mussels were also exposed to 0.4 mg/l of 585 oil for 2.5 days in a flow-through system. The efficiencies of the extractions for aminocarb, nonylphenol and 585 oil from sea water averaged 93, 79, and 72%, respectively. Concentration of aminocarb in water declined by an average of 40% during the 4 day period, with most of the decline occurring during the first 2 days. Nonylphenol concentrations decreased slightly over the 4 days, and 585 oil concentrations remained relatively constant over 2.5 days. Aminocarb in the mussels reached a maximum concentration at 2 days, declined by 4 days, and was not detected after 1 day post-exposure. Nonylphenol in the mussels reached a maximum concentration at 2 days and decreased by 4 days. It is concluded that aminocarb and nonylphenol concentrations in water of less than 0.01 mg/l are not likely to result in significant contamination of bivalves.

80-1677. Trottier, B. L.; Jankowska, I. (Dep. Chim., Univ. Moncton, Moncton, New Brunswick E1A 3E9, Canada) ***In vivo* study on the storage of fenitrothion in chicken tissues after long-term exposure to small doses.** *Bull. Environ. Contam. Toxicol.* 24(4): 606-610; 1980 (8 references).

The storage of fenitrothion in tissues after long term exposure was studied in male Hubbert chickens. Chickens were treated through stomach tubes with ^{3}H-fenitrothion at a dose of 10 mg/kg body wt twice a week every other week for 2 to 8 weeks. Animals were sacrificed 8 or 16 days after treatment, and tissue aliquots (whole bloods, liver, brain, and abdominal adipose tissue) were analyzed by liquid scintillation counting. The results indicate that 8 days after the last treatment measurable amounts of radioactivity were found in all tissues except the brain, but there was no evidence for bioaccumulation of radioactivity in these tissues. In animals sacrificed after 16 days there was a sharp decrease in the radioactivity content of all tissues, with the average values for brain and liver falling to the detection limits. It is concluded that, even after long-term exposure to small doses, chicken tissues retain no significant amounts of fenitrothion.

80-1678. Datta, D. V.; Narang, A. P. S. (Dep. Hepatol., Postgrad. Inst. Med. Educ. & Res., Chandigarh, India) **Effect of arsenic on liver.** *Bull. Postgrad. Inst. Med. Educ. Res.* 13(3): 180-188; 1979 (38 references).

The effects of arsenic on the liver are reviewed. Experimental studies on arsenic induced liver damage are discussed. Methods for estimating the arsenic content of biological samples are listed and discussed. The liver arsenic content in different diseased conditions is considered. It is noted that, while arsenic is not the sole cause of many diseases, damage from arsenic may be seen in cirrhosis, non-cirrhotic portal fibrosis, veno-occulsive disease and Indian childhood cirrhosis. Findings of arsenic in water, vegetables, soil, ayurvedic medicines and opium, from various sources of contamination including pesticide use, are reported.

80-1679. Dejoux, C.; Elouard, J. M. (Lab. Hydrobiol. ORSTOM, B.P. 1434 Bouake, Ivory Coast) **Action de l'Abate sur les invertebres aquatiques. Cinetique de decrochement a court et moyen terme. [Action of Abate on aquatic invertebrates. Detachment kinetic in the short and medium term.]** *Cah. ORSTROM Ser. Hydrobiol.* 11(3): 217-230; 1978 (8 references) (French).

The toxicity of Abate (temephos) to the aquatic invertebrate fauna of the Volta basin was investigated. Various concentrations of Abate (EC) applied at weekly intervals caused detachment of nontarget invertebrates, especially insect larvae, from their substratum, and also increased drift rate. These increases consistently appeared rapidly following appearance of the pesticide in the water, indicating a rapid response of the orgarisms to the chemical. The general dislodgement kinetics are similar for all invertebrate groups, but Baetidae and Caenidae (Ephemeroptera), Chironomids, and Trichoptera (*Macronema*) appeared to be more sensitive to the effects of the pesticide. Isolated Abate treatments applied to previously unexposed biota were found to have more drastic effects (> 50% mortality at concentrations com-

monly used for *Simulium* control) than application to populations frequently exposed to the pesticide. After the first series of drastic effects, subsequent treatments induced relatively small detachment of the organisms. This is suggested to be the reason that invertebrate populations are present in rivers even after a 2-yr treatment period.

80-1680. Georghiou, G. P. (Dep. Entomol., Univ. California, Riverside, CA 92521) **Mosquito resistance to insecticides.** *Calif. Agric.* 34(3): 33-34; 1980.

Current work regarding resistance to insecticides is summarized. In agricultural areas, mosquitos are subjected to indirect selection by sprays intended for crop pests, and thus develop a wide spectrum of multi-resistance. In California, three mosquito species are known to demonstrate multi-resistance to all organochlorine and organophosphorus insecticides that have been employed for their control, including DDT, malathion, parathion, fenthion, temephos, and chlorpyrifos. Work on the chemical defense mechanisms of these resistant strains has shown that their resistance is due mainly to the selection of esterases that detoxify a wide variety of organophosphorus compounds. A simple filter-paper test for detecting the presence of detoxifying esterases in individual mosquitos has been developed. Laboratory strains of mosquitos, each known to possess one or more of the known mechanisms of resistance, can be used to determine the impact of already existing resistance mechanisms on other insecticides. In addition compounds can be tested for their propensity to induce resistance. Research on the genetic and biological parameters the influence the evaluation of resistance has led to development of methods to counteract resistance, including the use of mixtures of pesticides and the rotation of pesticides.

80-1681. Deveckova, D.; Mydlik, M. (Eye Clin., Fac. Med., Pavla Jozefa Safarika Univ., Kosice, Czechoslovakia) **Poleptanie oka gramozonom. [Gramoxon ocular burns.]** *Cesk. Oftalmol.* 36(1): 7-10; 1980 (13 references) (Czech).

A case history of a successfully treated ocular burn caused by the herbicide Gramaxon (active substance paraquat: 1,1'-dimethyl-4,4'-dipyridilium dichloride) manifested by necrotic changes on the tarsal and bulbar conjunctiva is described. The symptoms (loss of vision) resemble the effects of lye on the eye but are slower to appear and do not include immediate formation of lesions in tissues. Penetration of paraquat into general circulation by conjunctival resorption caused generalized light intoxication affecting the liver and kidneys. Therapy included hemodialysis and hemoperfusions through activated carbon. Full vision was restored after 23 days.

80-1682. Lakowicz, J. R.; Hogen, D. (Gray Freshwater Biol. Inst., Dep. Biochem., Univ. Minnesota, Navarre, MN 55392) **Chlorinated hydrocarbon-cell membrane interactions studied by the fluorescence quenching of carbazole-labeled phospholipids: probe synthesis and characterization of the quenching methodology.** *Chem. Phys. Lipids* 26(1): 1-40; 1980 (44 references).

The quenching of carbazole-labeled phospholipids was studied. Carbazole fluorescence was collisionally quenched by various chlorinated hydrocarbon insecticides. This quenching was not accompanied by significant photodecomposition or by the appearance of additional fluorescence emissions. The fluorescence spectral properties of the carbazole derivatives and the observed quenching constants were not sensitive to the fluorophore concentration, either in solution or in lipid bilayers. The amount of quenching can be used to determine both the diffusion coefficient of the chlorinated hydrocarbon in the bilayer and its lipid-water partition coefficient, since the quenching of carbazole fluorescence revealed the collisional frequency of the fluorophore with the chlorinated hydrocarbon. It was indicated by the quenching analysis that phospholipid bilayers can be saturated with lindane. It is concluded that quenching of carbazole-labeled phospholipids provides a useful means of investigating the interactions of a wide variety of chlorinated hydrocarbons with lipid bilayers.

80-1683. Al-Badry, M. S. (Univ. Missouri, Columbia, MO) **Phthalate-organophosphate interactions: toxicity, cholinesterase inhibition, penetration and metabolism studies with house flies.** *Diss. Abstr. Int. B* 40(8): 3567; 1980.

The biological activity of insecticides can be modified by prior or simultaneous exposure of the test organism to another chemical agent. The 2 non-inductive interactions are synergism and antagonism. As a consequence of massive production and widespread usage, phthalates are ubiquitous in the environment. Organophosphates also are widely used as insecticides and acaricides. Thus phthalate-organophosphate interactions were investigated using the house fly as the test organism. Although phthalates were not toxic to female house flies when applied at high dosages, topically or by injection, an antagonistic interaction was observed upon simultaneous application of DEHP or DBP with various organophosphates. When house flies were pretreated with DEHP 30 min prior to topical application of organophosphate, a synergistic interaction was apparent. Further, using chlorpyrifos as a model organophosphate, it was shown that 16 other phthalates could interact synergistically. Also, using DEHP and DBP, the synergistic interaction was shown with 21 other organophosphates. Symptomology and cholinesterase inhibition studies provided some evidence that the phthalate increased the toxicity of the organophosphates. Mixtures of phthalate micro-chemical environmental pollutants with commercially available organophosphate insecticides and acaricides gave greater than additive toxicity when applied

topically to house flies. Although it cannot be concluded from these experiments that a similar phenomenon will occur in the environment, the present study suggests that such interactions are possible. (Author abstract by permission, abridged. Copies of the thesis are available from University Microfilms, order No. 8002336)

80-1684. Baggett, J. M, Jr. (Med. Cent., Univ. Mississippi, Jackson, MS) **The effects of the pesticide Kepone on adreno-medullary catecholamine levels in rats (Part A) and studies of pharmacological evaluation and treatment of idiopathic orthostatic hypotensive patients (Part B).** *Diss. Abstr. Int. B* 40(8): 3685; 1980 (4 references).

Rats (150-200 g) were treated initially with the pesticide Kepone (chlordecone) in the diet for 8 days and the adrenal glands were removed for biochemical and ultrastructural examination. The total catecholamine content of the glands showed a reduction of 54% from 22.07 ± 2.8 to 10.26 ± 1.2 μg/gland. The majority cell population (epinephrine) showed spherical granules which were depleted of core material, while the minority cell population (norepinephrine) maintained normal appearing elongated granules with electron dense matrix. It was found the Kepone selectively decreased epinephrine content 63% from 17.85 ± 1.47 μg/gland to 6.62 ± 1.5 μg/gland and increased norepinephrine content 28% from 5.02 ± 0.46 to 6.42 ± 0.59 μg/gland. Kepone and its structural analog, mirex, were given by intubation to rats at a dose of 3.5 mg/day (15.2 mg/kg or 200 ppm) for 8 days. The specific effect of Kepone on the adrenal medulla was confirmed; mirex had no statistically significant effect either on adrenal catecholamine content or ultrastructure when compared to controls. A dose-response series was run for Kepone ranging from 0.18 mg/day to 3.5 mg/day (10 to 200 ppm) administered by intubation for 6 days. Initial drug effects were seen at a dose between 0.88 and 1.75 mg/-day (50-100 ppm). Adrenal norepinephrine contents ranged from 1.99 μg/gland in controls to 3.14 μg/gland in rats receiving 3.5 mg/day. The epinephrine content ranged from 10.32 μg/gland in controls to 6.68 μg/gland in animals receiving 3.5 mg/day. (Author abstract by permission, abridged. Copies of the thesis are available from University Microfilms, order No. 8003768)

80-1685. Brimfield, A. A. (Utah State Univ., Logan, UT) **The covalent interaction of hepatic metabolites of the insecticide chlordane with cellular macromolecules in the rat and mouse *in vitro*.** *Diss. Abstr. Int. B* 40(8): 3686; 1980.

Microsomal preparations from livers of mice and rats were used and covalent binding of pure ^{14}C labeled *cis*- and *trans*-chlordane isomers as well as an isomeric mixture (3:1, *cis: trans*), to microsomal protein and RNA or to added calf thymus DNA was studied. Isolation of the protein, RNA and DNA from the *in vitro* microsomal systems and determination of unextractable radioactivity indicated that the chlordane derived material bound to each of the macromolecules investigated, except mouse liver microsomes which did not activate *trans*-chlordane to a form which bound to DNA in measurable amounts. Microsomal epoxide hydratase and aminopyrine demethylase activity were increased in chlordane pretreated rats and mice. The effect of this induction on the macromolecular interaction of chlordane metabolites was variable for both chlordane and phenobarbital pretreated groups. The results indicate little possibility that the primary epoxide metabolites of chlordane, oxychlordane, is involved in the binding. The effects of epoxide hydratase inhibition, however, indicate that some secondary epoxide is involved in the *cis*-chlordane binding to DNA in the mouse. (Author abstract by permission, abridged. Copies of the thesis are available from University Microfilms, order No. 8005096)

80-1686. Dougherty, K. K. (Univ. California, Davis, CA) **Induction of mixed function oxidase in primary cultures of adult mouse hepatocytes.** *Diss. Abstr. Int. B* 40(8): 3687-3688; 1980.

Hepatocytes were isolated from adult male Charles River CD-1 mice by *in situ* pre-perfusion of the liver with EGTA perfusate followed by perfusion with collagenase perfusate. The digested liver was dispersed and hepatocytes were isolated by filtration and differential centrifugation yielding 8×10^7 hepatocytes/mouse liver. The *N*-demethylation of *p*-chloro-*N*-methylaniline (PCMA) was used as a measure of MFO activity in freshly isolated hepatocytes and in those cultured for 24, 48 or 72 hr. PCMA *N*-demethylase activity was increased in freshly isolated hepatocytes by the addition of added cofactors; whereas cultured hepatocytes did not respond, indicating that cultured cells are intact. Both SKF-525A and CO inhibited *N*-demethylase activity indicating that this activity is an MFO dependent activity in cultured cells. To determine if humoral factors, thought to maintain MFO activity *in vivo*, would maintain *in vivo* levels of MFO in culture a mixture of testerone, estradiol, progesterone, corticosterone, D-thyroxine, glucagon, δ-amino-levulinc acid and vitamin E was tested and found to increase the cytochrome P450 concentration and *N*-demethylase activity of cells cultured for 24 hr. The addition of calf serum (10%) was also able to stimulate both cytochrome P450 and *N*-demethylase activity. Phenobarbital, added to culture medium with 5% calf serum, stimulated *N*-demethylation 40% at 10^{-3} *M* and 60% at 2×10^{-3} *M*; however, no increase was observed at 10^{-4} *M*. Mirex, a known inducer of *N*-demethylase in mice did not induce this activity in cultured mouse hepatocytes with or without serum. Mirex treated hepatocytes were cultured with and without hormones, and with and without serum (mouse, calf, and fetal calf) but mirex treatment did not cause an increase in activity. In addition, the cytochrome P450 con-

centration of mirex treated hepatocytes was not higher than control hepatocytes. (Author abstract by permission, abridged. Copies of the thesis are available from University Microfilms, order No. 8003501).

80-1687. Westlake, G. E.; Blunden, C. A.; Brown, P. M.; Bunyan, P. J.; Martin, A. D.; Sayers, P. E.; Stanley, P. I.; Tarrant, K. A. (Tolworth Lab., Agric. Sci. Serv., Min. Agric. Fish. & Food, Tolworth, Surbiton, Surrey KT6 7NF, England) **Residues and effects in mice after drilling wheat treated with chlorfenvinphos and an organomercurial fungicide.** *Ecotoxicol. Environ. Saf.* 4(1): 1-16; 1980 (29 references).

The effects of chlorfenvinphos and an organomercurial fungicide on mice were assessed. After wheat seeds treated with chlorfenvinphos and methoxyethyl mercury acetate (MEMA) were planted (by drilling), mice were trapped in the fields and in a control area, marked and released. The number of seeds on the surface were counted periodically, sampled, and tested for mercury levels. Upon recapture of the mice (0-35 days after seed treatment), enzyme assays were performed, and mercury and chlorfenvinphos levels within the tissues were measured. Seed-chlorfenvinphos dropped off rapidly; mercury on the seeds decreased at a much slower rate, staying at levels greater than 2 ppm 30 days after planting. Levels of the fungicide in the guts of mice declined in time after planting, but mercury levels showed no trend. Acetylcholinesterase and cholinesterase showed significant inhibition after 10 days and liver nitrophenyl acetate esterase showed significant inhibition for the first 3 days after planting. Enzyme inhibition followed tissue levels of the fungicide.

80-1688. Lingaraja, T.; Rao, P. S. B.; Venugopalan, V. K. (Cent. Adv. Study & Res. Mar. Biol., Annamalai Univ., Porto Novo, 608502, India) **DDT induced ethological changes in estuarine fish.** *Environ. Biol. Fish* 4(1): 83-88; 1979 (6 references).

Feeding rates of the predator fish *Therapon jarbua* (Forsk) on mullet juveniles were studied before and after exposure to DDT. Predators who had not been treated with DDT refused to consume mullet juveniles which had been treated with subacute concentrations of DDT. However, predators treated with a subacute concentration of DDT consumed more mullet juveniles. Changes were also noted in oriented behavior and co-ordinated movements among treated *T. jarbua.* Changes were evident in feeding, aggression and comfort behavior of the fish. Also noted were inflammation in the gills and caudal fin serration.

80-1689. Reddy, G.; Khan, M. A. Q. (Dep. Biol. Sci., Univ. Illinois, Chicago, IL) **Metabolism of photoisomer of isodrin insecticide in houseflies and mice.** *Environ. Pollut. & Human Health. Proc. Int. Symp. Ind. Toxicol.:* p. 543; 1978.

The *in vivo* and *in vitro* metabolism of photoisodrin in houseflies and male mice was investigated. Single oral administration of the labeled isomer to mice indicated that about 10 and 80% of the dose were eliminated in the urine and feces, respectively, after 4 days. Analyses indicated the presence of 3 metabolites in fly feces, and 5 metabolites in mouse feces along with 1 metabolite in the urine of mice. Concentrations of ^{14}C-photoisodrin in mouse tissues were highest in the fat, followed by the liver and other tissues. The *in vitro* metabolism of the pesticide occurred mainly in microsomal fractions, indicating mixed-function oxidase involvement.

80-1690. Walsh, G. E.; Bahner, L. H.; Horning, W. B. (Environ. Res. Lab., US EPA, Gulf Breeze, FL 32561) **Toxicity of textile mill effluents to freshwater and estuarine algae, crustaceans and fishes.** *Environ. Pollut. Ser. A.* 21: 169-179; 1980 (8 references).

Secondary effluents from 23 textile mills in the eastern US were collected for use in aquatic bioassays and analyzed for organic and inorganic composition. Among organic compounds found in the wastes were diethyl phthalate, hexachlorobenzene (HCB), trichlorofluoromethane and 1,1,2,2-tetra chloroethylene (perchloroethylene). Filtered or autoclaved effluent samples were used in bioassays of aquatic fresh and salt water (estuarine) algae, invertebrates, and fish species. *Daphnia pulex* was generally the most sensitive test organisms, but no animal responded to all wastes. All 23 samples affected the growth of the freshwater algae *Selenastrum capricornotum*; 8 samples (35%) were inhibitory and 15 (65%) stimulated growth. Fishes were generally less sensitive to wastes than the crustaceans. In freshwater *Daphnia pulex* was usually more sensitive (EC50 9-100%) than *Pimephales promelus* (LC60 16.5-46.5%).

80-1691. Rath, S.; Misra, B. N. (Lab. Environ. Toxicol., Dep. Bot., Berhampur Univ., Berhampur 760007, India) **Relative toxicity of dichlorvos (DDVP) to *Tilapia mossambica*, Peters, of 3 different age groups.** *Exp. Gerontol.* 14(6): 307-309; 1979 (11 references).

Ten *Tilapia mossambica* fish of one of three age groups were placed in 5 *l* glass jars containing aerated water (pH 7.0-7.5) at 29 ± 1°C to which 0.5-3.5 mg dichlorvos/l had been added and the mortality rates were determined at 24, 48, 72, and 96 hr. The median *TLm* values were 1.642, 1.632, 1.525, and 1.42 mg/l for 24, 48, 72, and 96 hr, respectively, for the 3-4 cm age group; 2.142, 1.954, 1.855 and 1.71 mg/l, respectively, for the 6-7 cm age group; and 2.533, 2.064, 2.130 and 1.934 mg/l, respectively, for the 9-10 cm age group. Dichlorvos flow through the gills was approximately proportional to size, and the ab-

sorption of the pesticides was calculated to be based on a per unit body weight basis. These results support the conclusions that an inverse relationship between toxicity and age and a direct relationship between active metabolism and age exist.

80-1692. Khasanov, T. S. (Uzbek Res. Inst. Sanit. Hyg. & Occup. Dis., Tashkent, USSR) **Gigienicheskoe normirovanie smesi geksakhlorana i fozalona v atmosfernom vozdukhe. [Hygienic standardization of mixture of hexachlorane and phosalone in atmospheric air.]** *Gig. Sanit.* 44(12): 11-15; 1979 (3 references) (Russian).

The effect of small concentrations of a mixture of hexachlorane (BHC) and phosalone on humans and animals was evaluated, and the maximum single and daily maximum permissible concentration (MPC) of the mixture in atmospheric air were determined. The threshold of olfactory acuity was studied in 25 individuals aged 18 to 32 yr. The threshold concentration of BHC and phosalone alone were 0.28 and 0.053 mg/m^3, respectively, (the subthreshold concentrations were 0.22 and 0.039 mg/m^3). The mixture of BHC and phosalone showed complete summation of the effects. The daily MPC of the mixture of phosalone and BHC was studied in a chronic experiment in albino rats. Animals were subjected to four 15-day chronic inhalation exposures with a 10-day interval. Concentrations of BHC and phosalone in inhalation chambers were 0.23 and 0.05 mg/m^3 (group 1); 0.11 and 0.024 mg/m^3 (group 2); and 0.051 and 0.011 mg/m^3 (group 3). There was a marked decrease of the activity of cholinesterase, alkaline phosphatase, and albumin fraction in rats from groups 1 and 2. The level of SH-groups in the whole blood was significantly decreased in rats from group 1. Animals from groups 1 and 2 also showed significant inhibition of phagocytic activity of neutrophils, while rats in group 3 showed no changes in the immunobiological parameters. Pathomorphological examination showed protein degeneration of the hepatocytes and epithelium of convoluted tubules of the kidney in rats from group 1; similar but less pronounced changes were recorded in rats from group 2.

80-1693. Gorbachevskaya, E. F. (All-Union Res. Inst. Hyg. & Toxicol. Pestic. Polym. & Plast., Kiev, USSR) **Vliyanie γ-izomera geksakhlortsikloheksana na obrazovanie antitel v usloviyakh khronicheskoi intoksikatsii. [Effect of γ-isomer of hexachlorocyclohexane on formation of antibodies during chronic poisoning.]** *Gig. Sanit.* 45(1): 72-73; 1980 (4 references) (Russian).

The effect of chronic poisoning with γ-hexachlorocyclohexane (HCCH; lindane) on antibody production was studied in rabbits. The animals were divided into 2 groups. Group 1 rabbits were subjected for 3 mo to daily ig administrations of HCCH at 4 mg/kg (0.02 LD50); rabbits in group 2 served as controls. After 3 mo, females were mated with untreated males, and the levels of immunocompetent cells in the blood were monitored during the entire pregnancy. The levels of plaque forming cells progressively increased from 6% prior to exposure to 23.0% at the end of exposure.

80-1694. Vrochinskii, K. K.; Pan'shina, T. M.; Voronina, V. M.; Rodionov, G. A.; Larionov, V. G.; Voronina, L. Ya. (All-Union Res. Inst. Hyg. & Toxicol. Pestic. Polym. & Plast., Kiev, USSR) **Gigienicheskoe normirovanie v vode vodoemov fungitsidov anilata i vitavaksa. [Hygienic standardization in bodies of water of fungicides anilate and vitavax.]** *Gig. Sanit.* 45(1): 73-74; 1980 (6 references) (Russian).

In attempt to standardize the levels of the fungicides anilate and vitavax (carboxin) in bodies of water, a series of hygienic and toxicological trials were carried out. The threshold concentrations of anilate (monoethanolamine salt of sulfanilic acid) and vitavax with respect to the organoleptic properties of the water were 2 and 1 mg/l, respectively. The toxicities of the fungicides were studied in chronic, 6-mo experiments in albino rats. The ig administration of anilate at 0.002 and 0.0005 LD50 (LD50 = 5300 mg/kg) did not result in any visible symptoms of poisoning, but induced mild pathomorphological changes in the lungs, liver, spleen, brain, kidneys, and adrenals. Administration of vitavax at 0.01 and 0.0002 LD50 (LD50 = 3200 mg/kg) caused slight distrophic changes in the liver.

80-1695. Ryazanova, R. A.; Gafurova, T. V. (F. F. Erisman Res. Inst. Hyg., Moscow, USSR) **Mutagennoe deistvie binarnoi smesi pestitsidov khlorofosa i tsineba. [Mutagenic effect of binary mixture of pesticides chlorophos and zineb.]** *Gig. Sanit.* 45(1): 80-81; 1980 (9 references) (Russian).

The mutagenic activities of chlorophos (trichlorfon) and zineb, singly and in combination) were studied in BALB/C mice. Four series of tests were performed. In series I, the animals were subjected to single po administrations of chlorophos at 0.0002, 0.02, 0.2 and 0.5 of the LD50 (LD50 = 250 mg/kg). Animals in series II were given single po doses of zineb at 0.0002, 0.001, 0.01, 0.02, 0.2 and 0.5 of the LD50 (LD50 = 5000 mg/kg). In series III, the mice were given chlorophos + zineb at 0.0002, 0.001, 0.01, 0.02, 0.1, 0.2 and 0.5 of the combined LD50 dose (LD50 = 4200 mg/kg), and in series IV, the mice were subjected to repeated administrations of the mixture at 0.0002, 0.002 and 0.02 of the LD50 for 3 mo. The animals were sacrificed 24 hr after the last administration and the incidence of chromosome aberrations in bone marrow was determined. Chlorophos alone increased the incidence of chromosome aberrations at doses of 0.02, 0.2 and 0.5 LD50 (1.6%, 1.4% and 3.4% compared to 0.6% in controls). The mutagenic effect of zineb was demonstrated at

0.002, 0.02, 0.2 and 0.5 LD50 (2.2%, 2.4%, 1.6% and 1.6%, respectively, compared to 0.6% in control). The mixture caused mutagenic effects at 0.001 and 0.02 LD50 (1.4% and 2.0%, respectively, compared to 0.4% in controls) when given in a single dose, and at 0.02 LD50 (1.4% compared to 0.4% in controls) when given in repeated doses.

80-1696. Parkinson, C. (Dep. Forensic Med., Med. Sch., Guy's Hosp., London SE 1, England) **The changing pattern of paraquat poisoning in man.** *Histopathology* 4(2): 171-183; 1980 (35 references).

The necropsy findings in 14 cases of paraquat poisoning (11 suicides, 1 accident and 2 unknown intent) are described. Pathological abnormalities are related to the quantity of paraquat ingested and the length of survival after poisoning. All patients (12 males and 2 females ages 16-77 yr) had ingested Gramoxone (20% paraquat). Death occurred between 6 hr and 26 days after drinking paraquat. Among the 8 deaths which occurred within 5 days of paraquat ingestion, toxic myocarditis, renal tubular necrosis and centrilobular liver cell damage were significant factors. In the 2 deaths which occurred 5 and 6 days after poisoning, similar abnormalities were present, in addition to respiratory failure. Among persons who died 8 to 26 days after drinking paraquat respiratory failure was the sole cause of death.

80-1697. Grant, H. C.; Lantos, P. L.; Parkinson, C. (Bland-Sutton Inst. Pathol., Med. Sch., Middlesex Hosp., London, England) **Cerebral damage in paraquat poisoning.** *Histopathology* 4(2): 185-195; 1980 (27 references).

The cerebral changes in the brains of 8 patients who died of paraquat poisoning (7 suicides and 1 of unknown intent) are described. All patients (7 males and 1 female ages 16-67 yr) ingested undiluted Gramoxone (20% paraquat). Changes seen in the brains (in order of frequency) were: edema, hemorrhages (subependymal and subarachnoid), neuronal damage, microglial activation, astrocytic gliosis, meningeal inflammation, and perivascular necrosis. The edema and hemorrhage suggest that paraquat may damage the cerebral blood vessels. Since abnormalities have also been reported in other organs, paraquat is concluded to be a multisystem poison.

80-1698. Meinkoth, J.; Quadagno, D. M.*; Bast, J. D. (Dep. Physiol. & Cell Biol., Univ. Kansas, Lawrence, KS 66045) **Depression of steroid-induced sex behavior in the ovariectomized rat by intracranial injection of cycloheximide: preoptic area compared to the ventromedial hypothalamus.** *Horm. Behav.* 12(3): 199-204; 1979 (10 references).

Ovariectomized, estrogen-primed adult Holtzman rats were used in studies designed to determine the effects of cycloheximide (CHX) on sexual receptivity. CHX in one of three concentrations (20, 10 or 5 μg) was injected into the preoptic area (POA) or ventromedial hypothalamus (VMD) 6 hr before a subcutaneous injection of estradiol benzoate (EB). Rats received 0.5 mg of progesterone 36 hr after EB injection, and were tested for sexual receptivity with a sexually vigorous male. Sexual receptivity was significantly repressed in CHX-treated rats as compared with controls, but there was no differential response to CHX injection relative to the location of drug placement in either the POA or VMD.

80-1699. Ohsawa, K.; Casida, J. E.* (Pestic. Chem. & Toxicol. Lab., Dep. Entomol. Sci., Univ. California, Berkeley, CA 94720) **Metabolism in rats of the potent knockdown pyrethroid kadethrin.** *J. Agric. Food Chem.* 28(2): 250-255; 1980 (17 references).

Kadethrin is almost completely metabolized and the metabolites excreted within a few days following oral administration to male rats at 0.8 mg/kg. Seventeen identified metabolites account for 79 and 32% of the ^{14}C-acid- and ^{14}C-alcohol-labeled kadethrin, respectively. Excreted esters (14%) are kadethrin, its α-hydroxy and 4′-hydroxy derivatives, and the thiolcarboxylic acid from opening the thiolactone ring. Cleavage of the cyclopropane carboxylate (> 67%) and thiolactone ($\geq$ 45%) esters probably results primarily from esterase and oxidase action, respectively. The liberated cyclopropane carboxylic acid (25%) is excreted free and as conjugates with glucuronic acid and glycine. The thioldicarboxylic acid, from both cyclopropane carboxylate and thiolactone cleavage, is either oxidized to the sulfonic acid (19%) or methylated and subsequently oxidized (23%), ultimately forming the methyl sulfone. The alcohol moiety yields 0.2-7% each of 5-benzyl- 3-furylmethyl alcohol and 5-benzyl- 3-furan carboxylic acid and its metabolites (glucuronide and glycine conjugates; α-hydroxy, α-keto, 4′-hydroxy, and 4′-sulfate derivatives). (Author abstract reprinted by permission of the American Chemical Society)

80-1700. Stevenson, R. E.; Burton, O. M.; Ferlauto, G. J.; Taylor, H. A. (Greenwood Genet. Cent., Greenwood, SC) **Hazards of oral anticoagulants during pregnancy.** *J. Am. Med. Assoc.* 243(15): 1549-1551; 1980 (17 references).

Prenatal exposure to oral anticoagulants during pregnancy may result in defective fetal development or life-threatening hemorrhage. Fetal exposure during the first 8 wk of pregnancy may cause abnormal development of the facial structures, hypoplastic digits, stippled epiphyses, and mental retardation. Midtrimester exposure may result in optic atrophy, faulty brain growth, and developmental retardation. Third trimester exposure may produce fetal

anticoagulation predisposing the infant to life-threatening hemorrhage in the perinatal period. Anticoagulation with heparin sodium does not provide a clearly safe alternative to warfarin, since this therapy has been associated with excessive fetal loss. (Author abstract by permission)

80-1701. Schaer, M.; Henderson, C. (Dep. Med. Sci., Coll. Vet. Med., Univ. Florida, Gainesville, FL 32610) **Suspected warfarin toxicosis in a dog.** *J. Am. Vet. Med. Assoc.* 176(6): 535-536; 1980 (7 references).

Warfarin toxicity symptoms were observed in a 7-yr-old spayed female dog. Packed cell volume (PCV) was 12%, the animal was lethargic, ecchymoses were noted on the trunk, extremities and mucous membranes, scleral hemorrhage was severe, bleeding persisted at 24-hr-old venipuncture sites, and slight gastric distention was revealed by abdominal radiography. Initial treatment with menadione (vitamin K_3) was only marginally successful. Treatment with phytonadione (vitamin K_1) was then begun and normal hemostasis was achieved by hospital day 5.

80-1702. Abdel-Monem, A. H.; Cameron, E. A.; Mumma, R. O. (Dep. Entomol., Pennsylvania State Univ., University Park, PA 16802) **Toxicological studies on the molt inhibiting insecticide (EL-494) against the gypsy moth and effect on chitin biosynthesis.** *J. Econ. Entomol.* 73(1): 22-25; 1980 (9 references).

All larval instars of *Lymantria dispar* (L.) were fed on treated diet containing 13 different concentrations varying from 0.0 to 2.0 ppm of EL-494 {N[[[5-(4-bromophenyl)-6-methyl-2-pyrazinyl]amino}-carbonyl]-2,6-dichlorobenzamide}, a molt inhibiting insecticide, and the larvae were scored for molting abnormalities. EC50 values of EL-494 for failure to molt the 1st time were 0.39-0.88 ppm and for failure to molt a 2nd time were 0.13-0.43 ppm. The 5th and 6th instars were the most susceptible while the 1st and 2nd instars were the least susceptible. Adult emergence, especially of females, was reduced by continuous feeding on concentrations of EL-494 that did not affect the 1st and 2nd molt. The incorporation of ^{14}C glucose into chitin was reduced 77% relative to controls when larvae were fed on diets containing 20 ppm of EL-494. (Author abstract by permission)

80-1703. Schein, L. G.; Donovan, M. P.; Thomas, J. A.*; Felice, P. R. (Dep. Pharmacol. & Toxicol., Sch. Med., Med. Cent., West Virginia Univ., Morgantown, WV 26506) **Effects of pesticides on ^{3}H-dihydrotestosterone binding to cytosol proteins from various tissues of the mouse.** *J. Environ. Pathol. Toxicol.* 3(1-2): 461-470; 1980 (19 references).

Studies were performed to determine the effects of parathion, dieldrin, DDT, and carbaryl on the binding of ^{3}H-dihydrotestosterone (DHT) to mouse cytosol proteins. Mature male mice were castrated 72 hr prior to sacrifice. Anterior prostate, seminal vesicles, liver, kidney, and intestine were excised, homogenized and centrifuged to obtain a clear cytosol fraction. ^{3}H-DHT was added to portions of the cytosol fraction with varying concentrations of the pesticides. Following 12 hr of incubation, assays for bound steroids were made with a scintillation spectrometer. Parathion (10^{-8}-10^{-5} *M*) inhibited binding in the prostate, seminal vesicle, kidney and liver. No effect on intestine cytosol was observed. The other pesticides showed no effect on binding. The mechanism of parathion interference with ^{3}H-DHT binding was not determined.

80-1704. Riskallah, M. R. (Cent. Agric. Pestic. Lab., Inst. Plant Prot., Agric. Res. Cent., Giza, Egypt) **Reduced sensitivity of cholinesterase as a factor of resistance in leptophos selected strain of the Egyptian cotton leafworm.** *J. Environ. Sci. Health B* 15(2): 181-192; 1980 (18 references).

The activities and sensitivities of cholinesterases (ChE) to inhibition by different insecticides, leptophos, methyl parathion, phosfolan (Cyolane), Cytrolane (mephosfolan), monocrotophos, Matacil (aminocarb), methomyl, cypermethrin, decamethrin and fenvalerate, in susceptible (S) and resistant (R) *Spodoptera littoralis* larvae were examined. The larvae had varying levels of cross resistance to several of the pesticides. The levels of ChE activity were nearly identical in both R and S strains. In R strain larvae, a large degree of insensitivity to ChE inhibition by leptophos-oxon, methyl paraoxon, Cyolane, Cytrolane, monocrotophos and Matacil was noted. The sensitivity of R strain larvae ChE was generally decreased when compared to the S strain. It was concluded that reduced ChE inhibition sensitivity could be a faster in *S. littoralis* resistance.

80-1705. Soliman, S. A.; El-Sebae, A. E. H.; Curely, A.; Ahmed, N. S. (Pestic. Div., Plant Prot. Dep., Fac. Agric., Alexandria Univ., Alexandria, Egypt) **Subcellular distribution of neurotoxic esterase activity in lamb and mouse brain.** *J. Environ. Sci. Health B* 15(2): 207-217; 1980 (14 references).

Paraoxon and synthesized mipafox were used to assess the distribution of neurotoxic esterase (NTE) enzyme activity. Nuclear, mitochondrial, microsomal and soluble fractions of mouse and lamb brain were prepared and preincubated for 20 min at 37°C with 40 μM paraoxon or 50 μM mipafox. The microsomal fractions of both mouse and lamb brains were found to contain the highest levels of NTE. THe relative specific activity of lamb NTE was inhibited to a greater extent by the organophosphate inhibitors than mouse NTE, indicating species variation in the abundance of the enzyme. The results are in agreement with the susceptibility to delayed organophosphate-induced neurotoxicity of different mammalian species.

80-1706. Doss, M. (Abt. Klin. Biochem. Fachber. Humanmed., Philipps-Univ., Marburg, BRD) **Pathobiochemical transition of secondary coproporphyrinuria to chronic hepatic porphyria in humans.** *Klin. Wochenschr.* 58(3): 141-148; 1980 (27 references).

Investigations of urinary porphyrins and porphyrin precursors are described. Secondary coproporphyinurias can be observed in one-third of all patients affected by liver damage. Every secondary coproporphyrinuria can potentially turn into a chronic hepatic porphyria. There are 2 requirements necessary for this transition. The first is genetic disposition of an autosomal dominantly inherited defect in uroporphyrinogen decarboxylase. The second is a toxic inhibitor of uroporphyrinogen decarboxylase in the liver caused by polyhalogenated hydrocarbons, such as hexachlorobenzene, polychlorinated and polybrominated biphenyls, dioxins and probably also methyl and vinyl chloride. The importance of the determination of porphyrinuria in the diagnosis of liver conditions is emphasized.

80-1707. Eidt, D. C. (Maritimes For. Res. Cent., Fredericton, New Brunswick, Canada) **Toxicity of aminocarb insects in a woodland stream.** *Maritimes For. Res. Cent. Rep.* M-X-96: 19 pp.; 1979 (13 references).

Aminocarb (Metacil) was injected from a mariotte bottle into a segment of the Manzer Brook at the rate of 4.7 μg commercial oil solution/l for 1.5 hr followed by 13.7 μg/l for 1 hr, or 2.5 μg/ EC/l AI for 1.5 hr, followed by 15.84 μg/l for 2.25 hr. Water samples for aminocarb concentration analyses and drift of aquatic invertebrates were sampled below the injection sites. Neither treatment caused catastrophic drift, or seriously affected survival of aquatic insects and mites. Water aminocarb concentrations decreased rapidly within 2-3 hr after administration. Laboratory toxicity tests showed that aminocarb emulsion is highly toxic. Even at 1 μg/l concentrations, only 9% of *Baetis* nymphs survived.

80-1708. Lakota, S. (Lab. Fish Biol. & Aquatic Environ., Inst. Zootechny, Krakow, Poland) **Badania nad toksyczoscia diuronu, linuronu, monolinuronu oraz monuronu dla narybku karpia w tescie ostrym. [Studies on the toxicity of the herbicides diuron, linuron, monolinuron and monuron.]** *Med. Weter.* 34(1): 20-22; 1978 (7 references) (Polish).

Carp fries were exposed to diuron, linuron, monolinuron and monuron at concentrations about 50 times lower then the respective LC50 values (5, 10, 50 and 1 mg/l for linuron, diuron, monolinuron and monuron, respectively) for 48 hr. All 4 pesticides induced similar lesions. The changes mainly concerned the branchia and were manifested in the form of hyperemia, extravasations, ischemia,and necrotic foci. These findings were confirmed by histopathological examinations. In addition, there was a significant hyperemia of branchial leaves, edema of the dorsal laminae with desquamation of epithelial cells, and focal regressive lesions of the branchial tissue, which led to the destruction of some laminae.

80-1709. Fehske, K. J.; Mueller, W. E.; Wollert, U.; Velden, L. M. (Pharmakol. Inst., Univ. Bonn, D-5300 Bonn, BRD) **The lone tryptophan residue of human serum albumin as part of the specific warfarin binding site. Binding of dicoumarol to the warfarin, indole and benzodiazepine binding sites.** *Mol. Pharmacol.* 16(3): 778-789; 1979 (37 references).

The interaction of warfarin and dicoumarol (Dicumarol) with tryptophan- and tyrosine-modified human serum albumin derivatives was investigated by equilibrium dialysis and circular dichroism measurements. The binding of warfarin to its specific high-affinity binding site is strongly reduced after the modification of the lone tryptophan residue of human serum albumin with 3 different reagents, while the modification of tyrosine residues has nearly no effect on the binding of warfarin to this site. It is concluded that the lone tryptophan residue is part of the warfarin binding site. Evidence is presented that dicoumarol interacts with the warfarin as well as the indole and benzodiazepine binding sites of the human serum albumin molecule. A highly reactive tyrosine residue specifically involved in the indole and benzodiazepine binding site seems to be important for the dicoumarol binding, too. Its nitration with tetranitromethane differently affects the 4 induced circular dichroism bands of dicoumarol bound to human serum albumin. This effect has been qualitatively and quantitatively characterized by the resolution of the induced circular dichroism spectrum of dicoumarol bound serum albumin into the Gaussian component bands using a computer program. The identification of the lone tryptophan residue as a part of the warfarin binding site of human serum albumin is a significant step forward in localizing this important drug binding site. (Author abstract by permission)

80-1710. Reichert, B. L.; Abou-Donia, M. B.* (Dep. Pharmacol., Med. Cent., Duke Univ., Durham, NC 27710) **Inhibition of fast axoplasmic transport by delayed neurotoxic organophosphorus esters: a possible mode of action.** *Mol. Pharmacol.* 17(1): 56-60; 1980 (30 references).

Several insecticides known to cause delayed neurotoxicity were examined for antitransport activity. The rat optic nerve served as the means to measure fast axoplasmic transport of proteins when the following chemicals were injected: *O*-methyl *O*-4-bromo-2,5-dichlorophenyl phenylphosphonothioate (leptophos); *O*-methyl *O*-2,5-dichlorophenyl phenylphosphonothioate; *O*-ethyl *O*-4-nitrophenyl

phenylphosphonothioate (EPN); *O*-ethyl *O*-4-cyanophenyl phenylphosphonothioate (cyanofenphos); and *O*-methyl *O*-2,4-dichlorophenyl phenylphosphonothioate (*S*-Seven; EPBP). Tri-*o*-cresyl phosphate and *O,O*-diethyl *O*-4-nitrophenyl phosphorothioate (parathion) were used as positive and negative controls, respectively. L-[^{3}H]Proline (50 μCi) and 5 $\mu\ell$ of the compound of interest (0.3 μmol) were injected into the vitreous humor of one eye (in dimethyl formamide/saline solution v/v) and a similar solution lacking the drug was introduced into the contralateral eye as a control. Marked inhibition of fast axoplasmic transport was observed by all phenylphosphonothioate esters and tri-*o*-cresyl phosphate. No antitransport activity was observed with parathion. The 40-50% lower transport activity in animals treated with delayed neurotoxins, as compared with activity in the negative control (parathion-treated) animals, offers preliminary support to the hypothesis that impairment of fast axoplamsic transport may be involved in the mechanism of action of neurotoxic organophosphorus esters. (Author abstract by permission of Academic Press)

80-1711. Jenssen, D.; Ramel, C. (Environ. Toxicol. Unit, Wallenberg Lab., Univ. Stockholm, S-10691, stockholm, Sweden) **The micronucleus test as part of a short-term mutagenicity test program for the prediction of carcinogenicity evaluated by 143 agents tested.** *Mutat. Res.* 75(2): 191-202; 1980 (78 references).

To evaluate the usefulness of the micronucleus test as a short-term assay for the detection of carcinogens, the correlation between micronucleus test data for 143 chemicals (including some pesticides) and corresponding cancer data, has been analyzed. For comparison, analogous data from Ames tests have also been collected for the same chemicals. In a comparison of the micronucleus test and the Ames test it was found that they had about the same specificity (around 80%) and predictive value (around 90%), while there was a significant difference in sensitivity in favor of the Ames test. The difference in sensitivity could be partly explained by differences in metabolizing capacities of these two test systems. It is concluded that a more elaborate test procedure for the micronucleus test would increase the sensitivity of this test. The principal value of the micronucleus test lies in the fact that it is an *in vivo* method, which may pick up effects at the chromosomal level not covered by bacterial assays. This is emphasized by the finding that the combination of the Ames test and the micronucleus test did increase the sensitivity of the screening procedure for the prediction of carcinogenic effects. (Author abstract by permission)

80-1712. Chang-Tsui, Y. Y. H.; Ho, I. K. (Dep. Pharmacol. & Toxicol., Med. Cent., Univ. Mississippi, Jackson, MS 39216) **Effect of Kepone (chlordecone) on synaptosomal catecholamine uptake in the mouse.** *Neurotoxicology* 1(3): 643-651; 1980 (34 references).

Mouse brain crude synaptosomal fractions were exposed to Kepone (chlordecone) at final concentrations of 1, 5, 10, 50, 100 and 500 μM. In a further study, groups of mice were given Kepone po at 50 mg/kg for 2 or 3 days. In the *in vitro* studies Kepone demonstrated a dose-dependent inhibition of catecholamine uptake into synaptosomes. The uptake of dopamine or norepinephrine decreased dramatically as the concentration of Kepone increased from 5 to 50 μM. Similar reductions of the synaptosomal uptakes of both dopamine and norepinephrine were noted in the *in vivo* studies conducted over a 3 day period. In mice treated for 2 days, the dopamine uptake was not significantly lower than controls and the norepinephrine uptake was not changed from control levels. These results substantiate the theory that Kepone-induced neurotoxicity may be due partly to its effect on the neurotransmitter uptake process.

80-1713. Duffy, F. H.; Burchfiel, J. L. (Dev. Neurophysiol. Lab., Child. Hosp. Med. Cent., Med. Sch., Harvard Univ., Boston, MA 02115) **Long term effects of the organophosphate sarin on EGGs in monkeys and humans.** *Neurotoxicology* 1(3): 667-689; 1980 (51 references).

Results with monkeys indicate that a single symptomatic exposure to sarin or a series of subclinical exposures can alter the frequency spectrum of spontaneous EEG for at least 1 yr. Significant changes occurred in the temporal region in the B frequency ranges. In a study of 77 industrial workers with documented histories of at least one exposure to sarin showed probable EEG differences between control subjects and those workers with one exposure, and highly significant differences in EEGs between controls and workers with multiple exposures to sarin. These differences tended to cluster in the B range. Some discussion is given to the development of automatic classification rules and toxicity symptoms produced by organophosphorus compounds are reviewed.

80-1714. Matsushita, T.; Aoyama, K. (Sch. Hyg., Fac. Med., Kagoshima Univ., Kagoshima, Japan) **[Participation of cross reaction in skin sensitization by pesticides.]** *Nippon Eiseigaku Zasshi (Jpn. J. Hyg.)* 35(1): 171; 1980 (Japanese).

The degree of cross sensitization between pesticides at onset of contact dermatitis was studied. Guinea pigs were preliminarily sensitized with diazinon, Kitazin P (IBP), daconil (chlorthalonil), paraquat, fenitrothion, benthiocarb, lannate (methomyl), kelthane (dicofol) thiophanate methyl, carptafol, simazine, Supracide (methidathion) or Bordeaux mixture. Slight to moderate cross contact reactions occurred after a challenge with either 0.2 or 2% benomyl. At 0.2%, benthiocarb, daconil,

fenitrothion, thiophanate methyl, captafol, paraquat, simazine and Bordeaux mixture gave approximately the same response. At the 2% challenge, Kitazin P, Bordeaux mixture and diazinon showed greater cross reactivity than the other compounds. Separately captafol has strong cross sensitization reactions with daconil, kelthane and Bordeaux mixture and daconil cross reacted strongly with Bordeaux mixture and moderately with fenitrothion and kelthane.

80-1715. Ohshima, H.; Nishimura, H.; Nishimura, N. (Sch. Hyg., Aichi Med. Coll., Nagoya, Aichi, Japan) **[Experimental studies on the toxicity of pentachlorophenol (PCP).]** *Nippon Eiseigaku Zasshi (Jpn. J. Hyg.)* 35(1): 173; 1980 (Japanese).

Subacute toxicity experiments were performed to determine the effects of pentachlorophenol (PCP) on body functions. Male Wistar rats (*ca.* 160 g) were given po doses of 40, 80 and 160 mg (PCP)/kg twice/wk for 4 wk. Body weight gain was suppressed in the 160 mg dosed group. Liver weight loss was significant in the 40 mg dose group. Significant increases in the left adrenal occurred in the 80 mg level group and in the right adrenal of the 160 mg group. Total cholesterol increased significantly in animals treated at the 2 highest doses. Urine pH decreased with increased dosages and liver glycogen content decreased in treated animals.

80-1716. Ando, M.; Wakisaka, I. (Dep. Environ. Hyg., Natl. Inst. Environ. Pollut., Tsukuba, Ibaragi, Japan) **[Effects of dietary factors on the transfer of 2,4,2′,4′-tetrachlorobiphenyl and DDT from mothers to new borns and sucklings.]** *Nippon Eiseigaku Zasshi (Jpn. J. Hyg.)* 35(1): 174; 1980 (4 references) (Japanese).

The effects of two dietary factors, protein and lipid content, on the persistence (residual concentration) of 2,2′,4,4′-tetrachlorobiphenyl and DDT were studied in pregnant, post-partum, and non pregnant Wister rats. Three levels of dietary protein, 10, 20 and 40%, and three levels of dietary lipid, 0.5, 5 and 20%, were given in the daily feed. Animals were fed the regulated diet from 7 wk and were bred at 11 wk. After breeding all animals were injected ip with the tetrachlorobiphenyl or DDT at 3.79 and 7.04 mg/kg, respectively. After 42 days, the animals were clinically examined. Newborns were tested just after birth, and sucklings were tested at 9 and 21 days. In non-pregnant rats, the concentration of the biphenyl in blood was affected by the amounts of dietary protein and dietary lipid individually as well as in combination. The concentration of biphenyl in fat was affected by the amount of dietary lipid, however, the effect of dietary protein was not remarkable. The concentrations of DDE, DDD (TDE), and DDT in blood and fat were affected by both dietary protein and dietary lipid. The effect of dietary factors was less remarkable in post-partum than in non-pregnant rats.

80-1717. Yamanaka, S.; Nishimura, M. (Sch. Hyg., Tokyo Dent. Coll., Tokyo, Japan) **[Effects of cholinesterase-inhibitors on isozyme-pattern. Part III. Acetylcholinesterase-isozymes in plasma erythrocite and brain.]** *Nippon Eiseigaku Zasshi (Jpn. J. Hyg.)* 35(1): 175; 1980 (1 reference) (Japanese).

Patterns of inhibited isozymes of non-specific cholinesterase (ChE) in plasma, and plasma, erythrocyte and brain ChEs were examined using male Wistar rats. The rats were administered po with parathion, dichlorvos, fenitrothion, Tokuthion and pyridafenthion at 0.5 of the LD50. In normal rat plasma, three ChE isozymes were inhibited by parathion and pyridafenthion. All isozymes except one were inhibited by Tokuthion. Two isozymes were inhibited by fenitrothion and three isozymes were slightly inhibited by dichlorvos. In rat brain, 4 AChE isozymes were identified and in rat erythrocytes, 3 AChE isozymes were identified. These AChE isozymes were inhibited by parathion.

80-1718. Minagawa, K.; Takizawa, Y. (Sch. Public Health, Fac. Med., Akita Univ., Akita, Japan) **[Effects of protein nutrition of the absorption by digestive tract and the distribution in body of carbaryl, dieldrin and paraquat dichloride.]** *Nippon Eiseigaku Zasshi (Jpn. J. Hyg.)* 35(1): 176; 1980 (Japanese).

Effects of protein nutrition on the digestive tract absorption of pesticides and the distribution of pesticides in the body were studied in SD male rats fed normal (25%), low protein (5%), and high-protein (40%) diets for 10 wk. After feeding and then a 15 hr fasting period, radio-labeled (10 μCi) pesticides, carbaryl (5 mg/kg), dieldrin (0.46 mg/kg) and paraquat (0.46 mg/kg) were administered orally. The order of greatest absorption was dieldrin, carbaryl and paraquat in the normal and low-protein diets. In the high-protein diet, the order was carbaryl, dieldrin and paraquat. All compounds were distributed in the mucosa of the small intestine. Carbaryl remained in the cytosol (65%), dieldrin remained in the nuclear and cellular debris (40-50%) and paraquat was found in both the cytosol and the nuclear and cellular debris. Rats on the low-protein diet showed the highest accumulations of carbaryl, dieldrin and paraquat. Carbaryl and paraquat were largely found in the kidney and dieldrin in the adipose tissues.

80-1719. Nomiyama, K.; Nomiyama, H. (Sch. Hyg., Med. Coll., Oyama, Tochigi, Japan) **[Effect of environmental temperature on the acute toxicity of methyl parathion and its mechanism.]** *Nippon Eiseigaku Zasshi (Jpn. J. Hyg.)* 35(1): 368; 1980 (1 reference) (Japanese).

ICR-JCL male mice were acclimated for 1 wk to temperatures of 8, 22, and 38°C, and were then administered ip with 10 mg/kg of methyl parathion. Blood samples were taken at 0, 3, 6, 9, 12, 24 and 48 hr after ad-

ministration. Mice became inactive after dosing but returned to normal by 9 hr. Cholinesterase activity of mice in the 22 and 38°C groups were reduced to a minimum (50% of normal) after 6 hr, and were recovered by 9 hr. Cholinesterase activity of mice in the 8° group (40% of the normal value of the 22° group) was reduced to a minimum (20% of the 22° group) at 3 hr after administration and was recovered at 24 hr. Plasma triglycerides in the 22° group were at a minimum (25% of normal) from 6 to 9 hr. They did not completely recover. The results are consistent with high methyl parathion toxicity at lower temperatures.

80-1720. Suzuki, M. (Sch. Nutr., Fukuyama Munic. Womens Jr. Coll., Fukuyama, Hiroshima, Japan) **[Effects of fibers in food on the intracorporeal behavior of BHC.]** *Nippon Eiseigaku Zasshi (Jpn. J. Hyg.)* 35(1): 375; 1980 (1 reference) (Japanese).

Burdock fibers (7%) were mixed in the diets of rats, which had been given BHC daily po for 21 days, to examine the physiological effects of fiber on BHC placental transfer. Weight gain and the amount of feed ingested were greater in rats fed burdock fibers than in those not fed fiber. The residual amounts of BHC in brain, liver, kidney, heart, lungs, testes and blood were smaller in rats fed fiber than in those not fed fiber. The rate of pregnancy, the numbers of deliveries, and the average body weight of newborns were larger in rats fed fiber than those not fed fiber. Residual amounts of BHC in fetal livers and kidneys were larger in rats not fed fiber than in those fed fiber.

80-1721. Umemura, A.; Watanabe, S.; Kambara, K.; Yasue, T.; Ohamae, M.; Nagamura, Y.; Mori, H. (Dep. Circulat. Organ, Prefect. Gifu Hosp., Gifu, Japan) **[A case of intoxication due to organophosphorus pesticide, to which artificial dialysis seemed to be effective.]** *Nippon Naika Gakkai Zasshi (J. Jpn. Soc. Intern. Med.)* 69(1): 66-67; 1980 (Japanese).

A 37-yr-old man ingested malathion and was admitted 6 hr later with delirium, vomiting, conspicuous cyanosis of the lips, slight miosis, incontinence, raised WBC, LDH, GOT, serum amylase and γ-GPT, reduced ChE, PH, BE and SaO_2. Mydriasis was noted at 8 hr. Malathion blood concentration was 0.1063 μg/dl. Gastric wash was performed shortly after hospitalization, PAM and atropine were administered, and hemodialysis and perfusion were performed. The concentration of malathion in the blood was reduced to zero after 2 days. The patient became lucid about 10 hr after hospitalization. On hospital day 3, ChE activity began to increase, and WBC, LDH and serum amylase levels were recovered on day 4.

80-1722. Furuya, M.; Komatsu, S.; Nakagawa, T.; Arakawa, H.; Inoue, S.; Masuda, H.; Kamisaka, Y.; Ida, T.; Fujiwara, Y. (Sch. Intern. Med. I, Fac. Med., Akita Univ., Akita, Japan) **[A case of autopsy of a man intoxicated by paraquat dichloride.]** *Nippon Naika Gakkai Zasshi (J. Jpn. Soc. Int. Med.)* 69(3): 371-372; 1980 (Japanese).

A 36-yr-old man was admitted to the hospital 3 days after attempting suicide by ingesting paraquat and warfarin. An arrhythmic pulse of 140/min, rapid respiration of 30/min and blood pressure of 120 over 70 mm Hg, delirium, jaundice and wet rales were observed on admission. Biochemical examination revealed raised alkaline phosphatase, GOT, GPT, BUN, and creatine and reduced PaO_2. The patient died 8 days after ingestion. Upon autopsy, fatty degeneration of the liver, biliary obstruction, hemorrhage in the lungs and brain parenchyma vessels and thrombosis of the liver, lung, brain and digestive tract were observed.

80-1723. Tanaka, R.; Fujisawa, S.; Nakai, K. (Sch. Pharmacol., Fac. Med., Akita Univ., Akita, Japan) **[Absorption of carbaryl, paraquat and dieldrin from the digestive tract.]** *Nippon Yakurigaku Zasshi (Folia Pharmacol. Jpn.)* 76(2): 55 p.; 1980 (Japanese).

The absorption and distribution of carbaryl, paraquat and dieldrin were studied using 12-14-wk-old, SD, male rats. [^{14}C] Carbaryl at 5 mg (10 μCi)/ml corn oil/kg, [^{14}C] paraquat at 0.46 mg (10 μCi)/ml water/kg and [^{14}C] dieldrin at 0.46 mg (10 μCi)/ml corn oil/kg were administered po to the rats and the animals were sacrificed after 1 and 5 hr. In another experiment, 4-wk-old rats were fed for 8-10 wk with either a low-protein diet (5%) or a high-protein diet (45%) and carbaryl, paraquat, and dieldrin were injected into the stomachs, duodenums, small intestines or veins. The pesticides were measured by scintillation. In the liver the amounts of the pesticides (in order of greatest to least) were carbaryl, dieldrin and paraquat at 1 hr, and, at 5 hr, dieldrin, carbaryl and paraquat. The amounts of paraquat and carbaryl in the livers and kidneys were greater after 1 hr than after 5 hr, dieldrin concentrations were greater after 5 hr. The results support the conclusion that dieldrin persists in the body while carbaryl and paraquat are rapidly excreted. The amounts of the pesticides in the liver were greater in rats fed the low-protein diet than in those fed the high-protein diet.

80-1724. Pimpraker, G. D.; Georghiou, G. P. (Div. Toxicol. & Physiol., Dep. Entomol., Univ. California, Riverside, CA 92521) **Mechanisms of resistance of diflubenzuron in the house fly *Musca domestica* (L.).** *Pestic. Biochem. Physiol.* 12(1): 10-22; 1979 (16 references).

One susceptible and three resistant strains of the housefly were used to elucidate the mechanism of resistance to diflubenzuron in the housefly. In bioassays, mature third-instar larvae were treated topically with 0.5 μl

diflubenzuron, with criterion of effect being failure of adults to completely emerge from the puparium. In penetration studies, larvae were treated topically with 0.01 μg (^{14}C)diflubenzuron, and at various intervals during the subsequent 24 hr, radioactivity was measured by a scintillation counter. Cuticular penetration of diflubenzuron into larvae of resistant (R) strains was about half that of the susceptible (S) strain. Chitin synthesis was reduced less in R larvae. Piperonyl butoxide and sesamex synergized diflubenzuron markedly in the R strains, indicating that mixed function oxidase enzymes play a major role in resistance. On the other hand, limited synergism by DET and diethylmaleate indicated that esterases and glutathione-dependent transferase play a relatively small role in resistance. Thin layer chromatography was used to determine diflubenzuron metabolites, and there were marked differences in the amounts of major metabolites produced. Diflubenzuron was metabolized by R larvae at considerably higher rates, with 18-fold lower accumulations of unmetabolized diflubenzuron as compared with S larvae. In addition, polar metabolites were excreted at a two-fold higher rate by R larvae.

80-1725. Khan, S. U.; Foster, T. S.; Akhtar, M. H. (Chem. & Biol. Res. Inst., Res. Branch, Agric. Canada, Ottawa, Ontario K1A OC6, Canada) ***In-vitro* metabolism of a mixture of atrazine and simazine by the solubl fraction (105,000 *g*) from goose, pig and sheep liver homogenates.** *Pestic. Sci.* 10(6): 460-466; 1979 (10 references).

The soluble fraction (105,000 *g*) from goose, pig and sheep liver-homogenates was found to contain an enzyme which metabolized a mixture of atrazine and simazine in *in-vitro* incubations by a combination of hydrolysis and partial *N*-dealkylation. Complete dealkylation was not observed as shown by the removal of only one alkyl group, but not both, from the compounds containing chlorine or hydroxyl-groups attached to the triazine ring. (Author abstract by permission)

80-1726. Schuntner, C. A.; Thompson, P. G. (Long Pocket Lab., Div. Entomol., CSIRO, Indooroopilly, Queensland 4068, Australia) **Toxicology and metabolism of chloromethiuron in *Boophilus microplus* larvae.** *Pestic. Sci.* 10(6): 519-526; 1979 (8 references).

The toxicity of the acaricide chloromethiuron (diazinon), and of 9 related compounds to *Boophilus microplus* larvae was determined by a spray-tower method. Metabolism of [^{14}C] chloromethiuron, in the formamidine susceptible but organophosphorus resistant Mt. Alford strain, was compared with that in a chlordimeform selected Mt. Alford strain, which in laboratory tests was 2-3 times resistant to chloromethiuron, chlordimeform and amitraz. The latter strain produced smaller quantities of the toxic *N*-demethyl derivative than the Mt. Alford strain; this was the only resistance mechanism determined. Rates of degradation of chloromethiuron were the same in both strains. Piperonyl butoxide strongly antagonized the toxicity of chloromethiuron by 18-33 times and depressed the production of the *N*-demethyl derivative in both strains (0.3 times that of the control), while degradation rates of chloromethiuron itself were halved by piperonyl butoxide in both strains. These results indicated that the parent material was not toxic until oxidized to the *N*-demethyl derivative. As, in addition, some symptoms of chloromethiuron toxicosis in larvae were similar to those caused by formamidine acaricides, a common mode of lethal action is suggested. (Author abstract by permission)

80-1727. Kulkarni, A. P.; Hodgson, E. (Dep. Entomol., North Carolina State Univ., Raleigh, NC 27607) **Metabolism of insecticides by mixed function oxidase systems.** *Pharmacol. Ther. Part A* 8(2): 379-475; 1980 (603 references).

The biochemistry of mixed function oxidase systems and *in vitro* and *in vivo* studies on the interactions of this system and insecticides are extensively reviewed. The sections of the review include the methodology of examining microsomal cytochrome P450 and NADPH-cytochrome P450 reductase, the metabolic oxidation reactions (desulfurization, cleavage, epoxidation, hydroxylation, dealkylation, dehydrogenation and sulfoxidation), the macromolecular binding of insecticides, and the chemical, physical, genetic, and physiological factors affecting insecticide metabolism.

80-1728. Mennuti, M. T. (Author address not given) **Drug and chemical risks to the fetus: occupational hazards for medical personnel.** *Prog. Clin. Biol. Res.* 36: 41-47; 1980 (25 references).

Possible teratogenic hazards to medical personnel from the voluntary use of drugs or occupational exposure to anesthetics or hexachlorophene are discussed. Information concerning the possible absorption and neurotoxicity to newborns, and teratogenicity of hexachlorophene are reviewed. It is suggested that until further information is available exposure be minimized whenever possible.

80-1729. Mansuy, D. (Lab. Chim., Ec. Norm. Super., F-75231 Paris, Cedex 05, France) **New iron-porphyrin complexes with metal-carbon bond – biological implications.** *Pure Appl. Chem.* 52(3): 681-690; 1980 (37 references).

Reactions of ferroporphyrins in the presence of an excess of reducing agent with various polyhalogenated compounds were studied. The involvement of iron-carbon bonds during the metabolism of substrates by cytochrome P 450 is suggested. Cytochrome P 450-carbene complexes are formed either by *in situ* reduction of some substrates by

cytochrome P 450-Fe(II) or by *in situ* oxidation of others by the active-oxygen cytochrome P 450 complex. Substrates mentioned include certain fungicides and DDT. Possible biological implications of the formation of these cytochrome P 450-iron-carbon bonds are discussed.

80-1730. Kuttan, R.; Lafranconi, M.; Sipes, I. G.; Meezan, E.; Brendel, K. (Dep. Pharmacol., Health Sci. Cent., Univ. Arizona, Tucson, AZ 85724) **Effect of paraquat treatment on prolyl hydroxylase activity and collagen synthesis of rat lung and kidney.** *Res. Commun. Chem. Pathol. Pharmacol.* 25(2): 257-268; 1979 (24 references).

Adult rats were administered 25 mg/kg ip injections of paraquat 9 days prior to sacrifice by exsanguination. Collagen synthesis in the lung of the treated rats was affected by the pesticide. Prolyl hydroxylase activity (a marker of collagen synthesis) was significantly ($p < 0.01$) elevated by the treatments, while hydroxyproline content (an indicator of total collagen content of lungs) was similar in both dosed and control animals. There was also no significant difference in the incorporation of ^{14}C proline or collagen formation in the treated and control rats. When paraquat (10^{-4}-10^{-3} *M*) was added to *in vitro* cultures in which lung slices from neonate rats were incubated marked decreases in collagen synthesis (10-fold) and protein synthesis (95%) were noted. Paraquat in concentrations of 10^{-4}-10^{-3} *M* added to lung cells in culture caused marked decreases in levels of prolyl hydroxylase (controls = 113,878 cpm/mg protein; 22,105 cpm/mg protein at 10^{-3} *M* paraquat exposure) and in collagen synthesis (17,041 and 1182 cpm/mg protein in control and 10^{-3} *M* paraquat, respectively). The results indicate that acute paraquat-induced lung damage does not biochemically resemble lung diseases in which collagen deposition plays a major role.

80-1731. de la Pena, E.; Tomatis, L. (Lab. Toxicol., Secc. Prot. Veg., Inst. Edafol. & Biol. Veg., C.S.I.C., Madrid, Spain) **Carcinogenicidad del DDT. [Carcinogenicity of DDT.]** *Rev. Esp. Oncol.* 26(2): 177-198; 1979 (91 references) (Spanish).

Mice were used in studies on the possible carcinogenicity of DDT. Lifetime exposure to concentrations of 2, 10, 50 and 250 ppm caused a high incidence of hepatomas in males, and lifetime exposure to 250 ppm technical grade DDT caused a high incidence of hepatomas in females. These DDT-induced hepatomas in many instances did not show obvious signs of invasiveness, and rarely metastasized. After cessation of treatment the DDT-induced hepatomas did not regress, but continued to grow. With lifetime exposure, the metabolite DDE caused a high incidence of hepatomas in both sexes; the metabolite DDD caused a high incidence of lung tumors. It is pointed out that long term studies on rats indicate a borderline carcinogenicity of DDT, while no effect has been seen in hamsters. Studies in man have been too limited to allow conclusions on the carcinogenic effect of DDT.

80-1732. Palut, D.; Cybulski, J.; Rozycki, Z. (Dep. Sanit. Toxicol., State Inst. Hyg., Warsaw, Poland) **Badania genetyczno-toksykologiczne insektycydow z grupy enolofosforanow. [Further genetic-toxicological investigations of insecticides from the group of enolophosphates.]** *Rocz. Panstw. Zakl. Hig.* 30(6): 599-606; 1979 (20 references) (Polish).

Effects of bromfenvinfos-methyl and bromfenvinfos on genetic material of mammalian cells were compared. In *in vitro* experiments using DNA from calf thymus, the process of incorporation of the chemicals showed a maximal rate of incorporation at the beginning of testing and a plateau effect after about 7 hr. DNA was attacked least by bromfenvinfos. *In vivo* experiments did not show any reaction of bromfenvinfos-methyl with nuclear DNA of rat liver. Low specific activity of DNA and a rapid disappearance of radioactivity were noted after the administration of bromfenvinfos. Maximum incorporation was observed after 120 hr and this persisted at a fairly high level during 240 hr. Bromfenvinfos-methyl was given ip to study incorporation into the protein of rat liver. Radioactivity peaked about 6 hr after administration, and then declined.

80-1733. Takahashi, T.; Yamamoto, K.; Watanuki, T.; Sugaya, T.; Minagawa, N.; Fukaya, H. (Sch. Pathol. I, Fac. Med., Tohoku Univ., Sendai, Miyagi, Japan) **[Morbid anatomy of paraquat poisoning with special reference to the changes in parenchymal organs.]** *Saishin Igaku (Med. Today)* 35(3): 604-612; 1980 (27 references) (Japanese).

Autopsy results of 8 patients, who died after ingestion of 1 to 120 ml paraquat, were compared. Bile duct injury in the liver and pancreas, acute tubular necrosis of the kidney, necrosis of the adrenal cortex, and fibrinoidnal necrosis of the arterial wall were observed in all cases. Clinical test results obtained during the course of treatment of the 8 patients are tabulated.

80-1734. Anonymous **Oiling the way to a cleaner body.** *Sci. News* 117(12): 188; 1980 (1 reference).

A 10% increase in the natural rate of elimination of chlorinated hydrocarbons from the body was observed in animals given a low-level diet of mineral oil (roughly 5% of their diet by weight). It is suggested that animals in the future which become contaminated by PCB's, for example, might be fed the mineral oil diet which would lessen their contamination, rather than sacrificing the animals as is the current practice. During treatment with mineral oil the level of contaminants in the blood did not elevate. Neither were signs present indicating that the oil had exited into the feces as had the chemical. It is suggested that the oil may be absorbed and metabolized during decontamination.

80-1735. Hollingworth, R. M.; Murdock, L. L. (Dep. Entomol., Purdue Univ., West Lafayette, IN 47907)

Formamidine pesticides: octopamine-like actions in a firefly. *Science* 208(4439): 74-76; 1980 (25 references).

The formamidine pesticide chlordimeform and its *N*-demethylated metabolites cause the light organ of the firefly *Photinus pyralis* L. to glow brightly. Monodemethyl chlordimeform is active at doses as low as 5 ng per insect when applied topically. This action is postsynaptic and probably involves membrane-bound receptors since cyproheptadine blocks the glows induced by both monodemethyl chlordimeform and octopamine, the putative neurotransmitter in the light organ. The pesticidal and pestistatic properties of the formamidines may result from actions on octopaminergic systems. (Author abstract by permission)

80-1736. Kimura, M.; Suzuki, E.; Ohnishi, H. (Sch. Pediatr., Fac. Med., Yamaguchi Univ., Ube, Yamaguchi, Japan) **[A case of autopsy of an infant intoxicated by paraquat dichloride.]** *Shonika Rinsho (Jpn. J. Pediatr.)* 33(4): 732-734; 1980 (9 references) (Japanese).

A boy, approximately 3.5 yr old, was hospitalized with symptoms of tetanus and skin necrosis after playing in a tea field where paraquat had been used 4 days previously. Skin necrosis of the left thigh, hypogastric region, lips, and tongue suggested paraquat had been ingested. Paraquat was detected in the urine after catheterization. Blood urea nitrogen was 118 mg/dl, serum GOT was 564 u and GPT was 243 u. After hemodialysis and forced diuresis, the levels returned to normal. The patient died on hospital day 21 with complications of the pneumothorax, and emphysema of the mediastinal cavity and subcutaneous cervical region. Upon autopsy hardened lungs with little air, congestion and scattered hemorrhapic lesions were observed. A conspicuous proliferation of juvenile collagen fibers, thickened alveolar walls, remarkably narrowed alveolar cavity, and metaplasia of the squamous epithelium in the bronchioles were noted histologically. Changes in the kidneys and liver were also evident.

80-1737. Bogolepov, N. K.; Kaplan, S. I.; Luzhetskaia, T. A. (N. I. Pirogov Second Medical Inst., Moscow, USSR) **Otdalennye polinevropatii posle otravleniia Khlorofosom. [Long-term polyneuropathies after chlorophos poisoning.]** *Sov. Med.* (11): 109-111; 1979 (3 references) (Russian).

The long-term neurotoxic complications of chlorophos (trichlorfon) poisoning in two patients (women, ages 19 and 71 yr) are reported. The first patient drank 50 ml of chlorophos, and the second patient sprayed chlorophos aerosol in her apartment. Symptoms of encephalomyelopolyradiculoneuritis developed 2-3 wk after acute chlorophos poisoning. Symptoms included nausea, vomiting, tachycardia, psycho-motor excitation, delirium and paresis. The first patient recuperated 8 mo after poisoning. The second patient died. Post-mortem examination revealed mild hypermia of the brain.

80-1738. Takesue, M. (Dep. Pediat., Sch. Med., Toho Univ., Tokyo, Japan) **[Changes and recoveries of liver enzymatic activities in young rats given PCB and β-BHC through admixed feeds or mother's milk.]** *Toho Igakkai Zasshi (J. Med. Soc. Toho Univ.)* 26(5): 576-586; 1979 (41 references) (Japanese).

PCB and β-BHC were administered singly and in combination in the diet to rats and to neonates via lactation. After feeding 10 and 100 ppm BHC for 7 days, flucuronyl transferase and γ-GTP levels increased and GOT and aldolase decreased along with body weight. Similar symptoms were observed after similar administration of PCB. In rats given PCB and β-BHC simultaneously, the rise in activity of glucuronyl transferase was additive. In both the single and combined administrations of PCB or β-BHC the activity of liver glucuronyl transferase was still higher than controls 21 days after dosing had stopped. When administration via the diet or mothers' milk was stopped, a tendency toward recovery appeared. No synergistic effects between PCB and β-BHC were noted.

80-1739. Heinz, G. H.; Hill, E. F.; Contrera, J. F. (Patuxent Wildl. Res. Cent., Laurel, MD 20811) **Dopamine and norepinephrine depletion in ring doves fed DDE, dieldrin, and Arochlor 1254.** *Toxicol. Appl. Pharmacol.* 53(1): 75-82; 1980 (36 references).

The levels of dopamine and norepinephrine were measured in one-half of the brain of ring doves fed a control diet or a diet containing 2, 20, or 200 ppm DDE; 1, 4, or 16 ppm dieldrin; or 1, 10, or 100 ppm Aroclor 1254. Levels of DDE, dieldrin, or Aroclor 1254 were determined in the other half of each brain. The intermediate and high levels of each chemical caused depletions in both neurotransmitters, and brain residues of each chemical were negatively correlated with levels of neurotransmitters. The highest concentrations of DDE, dieldrin, and Aroclor 1254 depressed averages of dopamine to 42.4, 41.4, and 45.2% of the control level and norepinephrine to 61.6, 62.0, and 56.9% of controls, respectively. Depletions of dopamine and norepinephrine could result in abnormal behavior of contaminated birds in the wild, and the detection of such depletions could become an important tool in assessing contaminant-induced behavioral aberrations in birds. (Author abstract by permission)

80-1740. Kozik, M. B.; Wigowska-Sowinska, J. (Dep. Neuropathol., Acad. Med., Poznan, Poland) **Changes in the activity of some hydrolases of the brain after the administration of methoxyethylmercuric chloride.** *Toxicol. Appl. Pharmacol.* 53(1): 122-133; 1980 (22 references).

The effect of the administration of methoxyethylmercuric chloride (Ceresan; MEMC) on the activity of phosphatases and esterases of the rat brain was studied. From the observations made in this study it appears that in-

gestion of Ceresan, a fungicide of wide agricultural application, leads to a considerable increase of activity of many hydrolytic enzymes in the brains of rats treated with this compound. The changes of the histoenzymatic pattern resulting from the administration of this fungicide reveal a significant topographical differentiation. (Author abstract by permission)

80-1741. Cianflone, D. J.; Hewitt, W. R.; Villeneuve, D. C.; Plaa, G. L. (Dep. Pharmacol., Fac. Med., Univ. Montreal, Montreal, Quebec H3C 3J7, Canada) **Role of biotransformation in the alterations of chloroform hepatotoxicity produced by Kepone and mirex.** *Toxicol. Appl. Pharmacol.* 53(1): 140-149; 1980 (33 references).

A previous report demonstrated that pretreatment of mice with Kepone (chlordecone) resulted in marked potentiation of $CHCl_3$-induced hepatotoxicity whereas pretreatment with a structural analog, mirex, had no effect on the liver injury produced by a challenging dose of $CHCl_3$. To determine some of the possible mechanisms for this difference in potentiating ability, various parameters were studied. The hepatic content of mirex and Kepone was determined 42 hr after the oral administration of each agent to male Swiss-Webster mice. The concentration of mirex within the liver increased in a dose-related fashion. Following a single dose (50 mg/kg) of either mirex or Kepone, the hepatic content of each agent was approximately equal. Kepone (50 mg/kg, po) had no effect on mouse hepatic glutathione content at 18 hr. The relationship between the effects of mirex and Kepone on microsomal and mixed function oxidase (MFO) activity and the *in vivo* and *in vitro* irreversible binding of $^{14}CHCl_3$ reactive metabolite(s) to hepatic constituents was assessed at 18 hr. Mirex pretreatment (10, 50, 250 mg/kg) resulted in a more profound effect on hepatic MFO activity than did pretreatment with Kepone (50 mg/kg). However, mirex pretreatment (50 mg/kg) did not alter either the *in vivo* or *in vitro* irreversible binding of $^{14}CHCl_3$-derived radioactivity to mouse hepatic constituents. In contrast, pretreatment of mice with Kepone (50 mg/kg) resulted in profound increases in both the *in vivo* and *in vitro* irreversible binding of $^{14}CHCl_3$ metabolites. Thus it appears that the disparate potentiating ability of mirex and Kepone are related to a difference in the capacity of these agents to increase the activity of the $CHCl_3$ bioactivation system of the liver. (Author abstract by permission)

80-1742. Abou-Donia, M. B.; Graham, D. G.; Ashry, M. A.; Timmons, P. R. (Dep. Pharmacol., Duke Univ. Med. Cent., Durham, NC 27710) **Delayed neurotoxicity of leptophos and related compounds: differential effects of subchronic oral administration of pure, technical grade and degradation products on the hen.** *Toxicol. Appl. Pharmacol.* 53(1): 150-163; 1980 (37 references).

Pure and technical grade leptophos and some of its degradation products were screened for delayed neurotoxicity following daily oral administration to hens. Minor modification of the leptophos molecule did not abolish its neurotoxic effect. In contrast, the hydrolytic products, 4-bromo-2,5-dichlorophenol and phenylphosphonic acid, had no neurotoxic action. The effectiveness of esters to induce delayed neurotoxicity was, in descending order: desbromoleptophos > pure leptophos > technical grade leptophos > leptophos oxon. Leptophos oxon was only weakly effective as a neurotoxic agent. Histopathologic examination of hens that died during the study or were killed 30 days after completion of treatment showed marked axon and myelin degeneration in the sciatic, peroneal, and tibial nerves and spinal cord of most hens. The lesions in peripheral nerves were generally seen earlier and in fewer hens than those in spinal cord. The most consistent histopathological changes were degeneration of axons and myelin in the spinal cord. Leptophos oxon was the most potent inhibitor of brain and plasma cholinesterases. Also, the activity of plasma butryl cholinesterase was more inhibited than brain acetylcholinesterase. Controls consisted of 4 groups of hens given daily oral doses of 10 mg/kg TOCP, 1.0 mg/kg parathion, and an empty gelatin capsule. TOCP treated hens developed delayed neurotoxicity while those given parathion showed initial leg weakness but subsequently recovered without developing delayed neurotoxicity. Control hens receiving gelatin capsules remained normal. This study suggests that changes in structure of leptophos as it is absorbed, metabolized, accumulated, and eliminated *in vivo*, significantly affect the development and severity of delayed neurotoxicity. (Author abstract by permission, abridged)

80-1743. Lee, P. W.; Arnau, T.; Neal, R. A. (Cent. Environ. Toxicol., Dep. Biochem., Sch. Med., Vanderbilt Univ., Nashville, TN 37232) **Metabolism of α-naphthylthiourea by rat liver and rat lung microsomes.** *Toxicol. Appl. Pharmacol.* 53(1): 164-173; 1980 (30 references).

α-Naphthylthiourea (ANTU) is metabolized by rat liver and lung microsomes to α-naphthylurea (ANU) and atomic sulfur. A portion of the atomic sulfur formed in this reaction covalently binds to macromolecules of the liver and lung microsomes. Approximately half the atomic sulfur bound to the liver and lung microsomes appears to have reacted with cysteine side chains of the microsomal proteins to form a hydrodisulfide. The loss of cytochrome *P*-450 and monooxygenase activity seen on incubation of liver microsomes with ANTU is likely the result of the covalent binding of atomic sulfur to cytochrome *P*-450. The available evidence suggests that the pulmonary toxicity of ANTU results, at least in part, from the covalent binding of a cytochrome *P*-450 monooxygenase catalyzed metabolite of ANTU to pulmonary macromolecules. This metabolite is most likely atomic sulfur or alternatively, one containing the carbonyl carbon of ANTU. However, it is

possible that the binding of both metabolites may be responsible for the lung toxicity. (Author abstract by permission)

80-1744. Abou-Donia, M. B.; Graham, D. G.; Abdo, K. M.; Komeil, A. A. (Dep. Pharmacol. & Pathol., Med. Cent., Duke Univ. Durham, NC 27710) **Delayed neurotoxic, late acute cholinergic effects of *S,S,S*-tributyl phosphorotrithioate (DEF): subchronic (90 days) administration in hens.** *Toxicology* 14(3): 229-243; 1979 (16 references).

Nineteen-mo-old mixed breeding hens were administered daily doses of DEF either orally (0.1-80 mg DEF/kg for 3 mo), or by topical application (20 and 40 mg/kg applied to the comb for 3 mo). Hens given 40 and 80 mg/kg daily oral doses, and those receiving topical applications, were pretreated with atropine sulfate against the cholinergic effects of DEF. Hens given 40-80 mg/kg oral doses for 4 days developed signs of cholinergic poisoning, including weakness, malaise, and loss of balance followed by paralysis. These birds died at day 14-18. Hens treated topically were protected by the atropine sulfate pretreatment and while DEF consistently produced delayed neurotoxicity, none of these birds developed signs of cholinergic or late acute effects. Fowl given small daily oral doses (0.5-20 mg/kg) developed signs of delayed neurotoxicity 8-30 days after the beginning of treatment. The severity of clinical signs depended on the dosage consumed. Doses of 0.5-1.0 mg/kg produced mild ataxia, while those hens receiving 20 mg/kg progressed to ataxia near paralysis stage. Orally administered DEF was rapidly metabolized by the hens to *n*-butyl mercaptan, which apparently caused the late acute toxic effects.

80-1745. Ingelman-Sundberg, M. (Dep. Chem., Karolinska Inst., Stockholm, Sweden) **Bioactivation or inactivation of toxic compounds.** *Trends Pharmacol. Sci.* 1(7): 176-179; 1980 (7 references).

Aspects of the toxicology of drugs including the biotransformation of environmental chemicals to reactive intermediates, which are often responsible for carcinogenesis, mutagenesis and cellular necrosis, are discussed. The 2 phases of the microsomal drug-metabolizing system are described. Phase 1 consists of oxidation, reduction and hydrolysis by the microsomal mono-oxygenase system. Phase 2 consists of conjugation by a series of microsomal and soluble enzymes. The rate and nature of the biotransformation of different chemicals is dependent on the type of environment to which the individual is exposed, in addition to genetic and physiological factors. The reactive intermediates produced in the metabolism of some compounds (including parathion) are listed, and the type of toxicity produced is described. Some of the factors important in determining the detoxification of the reactive intermediates are discussed, including the availability of the conjugating reagent. A number of factors which influence the steady-state level of a given reactive intermediate are listed, including the level of the activating enzymes, the levels of the conjugating enzymes, the relation between the level of cofactors and reactive intermediates, and competition between compounds for conjugation.

80-1746. Revzin, A. M. (Civ. Aeromed. Inst., Oklahoma City, OK) **Development of electrophysiological indices of neurological toxicity for organophosphate pesticides and depressant drugs.** *US NTIS AD Rep.* AD-A070,299: 18 pp.; 1979 (35 references).

The effects of certain drugs and environmental pollutants on brain mechanisms controlling these visual reflexes were investigated using single nerve cell recordings in animal model systems. Most agents studied deleteriously affected reflex functions at extremely low doses. This was especially true for organophosphate pesticides, related cholinergic compounds, and ethyl alcohol. Some drugs, such as imipramine and amphetamine, seemed to have little deleterious effect. Overall, the results suggest that some drugs and environmental pollutants can impair visual functions at doses not normally considered hazardous, and thus indicate the need for extreme caution in evaluating the safety margins of such materials in aviation medicine. (Author abstract by permission)

80-1747. Lorz, H. W.; Glenn, S. W.; Williams, R. H.; Kunkel, C. M.; Norris, L. A.; Loper, B. R. (Res. & Dev. Sect., Oregon Dep. Fish & Wildl., Corvallis, OR) **Effects of selected herbicides on smolting of coho salmon.** *US NTIS PB Rep.* PB-300,441: 125 pp.; 1979 (198 references).

Static 96 hr LC50 values for 11 water soluble herbicides with yearling coho salmon in freshwater were: acrolein 68 μg/l; dinoseb 100 μg/l; picloram 5.0-17.5 mg/l; 2,4,5-T (triethylamine) > 10 mg/l; atrazine > 15 mg/l; diquat 30 mg/l; amitrole-T 70 mg/l; paraquat 76 mg/l; dicamba > 100 mg/l; and Krenite (ammonium ethyl carbomyphosphonate) and 2,4-D (dimethylamine) > 200 mg/l. Amitrole-T, diquat, and paraquat exposure in freshwater reduced the survival of salmon smolts placed in seawater. Diquat also inhibited downstream migration of smolts. Under normal field use, acrolein and dinoseb could produce mortality of all life stages of salmonids if treated irrigation waters were released into streams prior to herbicide inactivation. The use of diquat at recommended treatment levels could reduce downstream migration of smolts and decrease survival in seawater. All other herbicide formulations tested appeared to have no effect on smolting of coho salmon. (Author abstract by permission)

80-1748. Sigmon, C. F. (Water Resources Res. Inst., Clemson Univ., Clemson, SC) **Physiological effects of 2,4-**

D and 2,4,5-T on selected aquatic organisms. *US NTIS PS Rep.* PS-79,0976: p. 11; 1979.

The sublethal effects of 2,4-D and 2,4,5-T (butoxyethanol esters) on several aquatic animals were examined. The herbicide did not significantly affect oxygen consumption in *Lepomis macrochirus* (bluegill) exposed to 3 ppm of 2,4-D or 2,4,5-T for 8 days. *Daphnia pulex* exhibited greater oxygen consumption when exposed to 3 ppm of 2,4,5-T at 30°C. Oxygen consumption in control and treatment groups did not differ at lower temperatures or for 2,4-D exposure. Mortality, pupation, and emergence were examined for *Chironomus* sp. exposed to 1 or 3 ppm of 2,4-D or 2,4,5-T. Significantly greater mortality and lower percentage pupation were observed in groups exposed to 3 ppm 2,4,5-T at 30°C. (Author abstract by permission)

80-1749. Leber, A. P.; Thake, D. C. (Battelle Columbus, Lab., Columbus, OH) **Carcinogenic potential or rotenone. Phase II: Oral and intraperitoneal administration to rats.** *US NTIS PS Rep.* PS-79,0976: p. 18; 1979.

In the ip study, test groups of male and female Sprague-Dawley rats were given daily doses of 0, 1.7 or 3.0 mg/kg of rotenone for 42 days. The high rotenone dosage groups showed decreased weight gain but there was no effect on mortality. There were numerous mammary gland neoplasms, mostly fibroadenomas, detected but they occurred with similar frequency among control and treatment groups. Except for 2 lymphosarcomas which occurred in high dose females, all other neoplasms were rare and/or not dosage related. In the oral study, groups of male and female Wistar rats were given daily doses of 0, 1.7 or 3.0 mg/kg of rotenone by gavage for 42 days. There were no appreciable effects of rotenone dosage on body weight, mortality, or non-neoplastic disease. Ductal ectasias and cysts were slightly more prevalent in mammary glands of dosed females as compared to controls. There was no evidence from either the ip or oral project that rotenone induced mammary neoplasia in the rat strains studied. The significance of the slight increases in fibrosarcomas and fibromas in both the ip and oral studies and in adrenal cortical adenomas in the oral study was inconclusive. (Author abstract by permission)

80-1750. Hilsenhoff, W. L.; Kotila, P. M. (Water Resources Cent., Wisconsin Univ., Madison, WI) **Effects of antimycin on stream insects.** *US NTIS PS Rep.* PS-79,0976: p. 58; 1979.

The toxicity of antimycin to 39 species of Wisconsin stream insects was evaluated in static, aerated bioassays utilizing antimycin exposures typical of stream treatments used to kill fish. Several species of Trichoptera, Ephemeroptera and Plecetoptera were very sensitive to fish killing concentrations of antimycin (EC50 less than 50 ppb). Beetles (*Psephenus herricki, Optioservus fastiditus, Stenelmis crenata, Helichus striatus*), dragonfly nymphs (*Neurocordulia molesta, Gomphurus vastus*), damselfly nymphs (*Argia apicalis*), fishfly larvae (*Nigronia serricornis*), and snipe fly larvae (*Atherix variegata*) were relatively unaffected by antimycin (EC50 greater than 100 ppb). Early instars of *Tipula* spp. and *Ephemerella* sp. were more sensitive to antimycin than later instars. Exposure to antimycin produced greater mortality at 19°C than at lower temperatures in several species, even though exposure times were reduced at the higher temperature. Post-exposure observations indicated mortality may be delayed more than 5 days, particularly at reduced temperatures. (Author abstract by permission)

80-1751. Thomas, J. A. (Dep. Pharmacol., Med. Cent., West Virginia Univ., Morgantown, WV) **Effect of pesticide interactions upon the reproductive system.** *US NTIS PS Rep.* PS-79,0976: p. 84; 1979.

The metabolism of 1,2-3*H*-testosterone *in vitro* was studied in prostate glands and livers of rats and mice treated with different pesticides including dieldrin and parathion. The metabolism of 1,2-3*H*-testosterone (T-3*H*) *in vitro* by mouse anterior prostate glands or hepatic microsomes has been studied after the oral administration of dieldrin (2.5 mg/kg daily for 5 or 10 days) and/or parathion (1.3, 2.6, or 5.2 mg/kg daily for 5 or 10 days). T-3*H* metabolism in the prostate was unaffected by the various treatment regimens. Dieldrin (10 days) caused some reduction in the microsomal production of androstenedione-3*H* or dihydrotestosterone-3*H*. Only treatment regimens with dieldrin stimulated hepatic testosterone hydroxylases; parathion alone had no effect. This study revealed that dieldrin and parathion can interact and produce biological effects different from those caused by either pesticide alone. (Author abstract by permission)

80-1752. Keller, W. C. (Inst. Technol., US Air Force, Wright Patterson AFB, OH) **A comparison of the effects of mineral oil, vegetable oil, and sodium sulfate on the intestinal absorption of DDT.** *US NTIS PS Rep.* PS-79,1029: p. 5; 1979.

The purpose of this research was to compare the effects of mineral oil, vegetable oil, and sodium sulfate on the intestinal absorption of a highly lipid soluble toxicant, DDT. Intestinal absorption was evaluated in rats by measuring DDT and metabolite recovery in feces, by measuring the concentration of DDT in adipose tissue, and by measuring the concentration of DDT in thoracic lymph following oral administration of DDT and each agent. Vegetable oil was shown to significantly increase absorption of DDT when compared to all other treatments. (Author abstract by permission)

80-1753. Sikka, H. C. (Syracuse Res. Corp., Syracuse, NY) **Screening methods for toxic substances.** *US NTIS PS Rep.* PS-79,1029: p. 83; 1979.

The present report deals with the application of fluorescent probe technique to the detection of conformational changes in rat brain synaptosomes under the influence of certain neurotoxic chemicals, chlorophenothane (DDT) and diphenylhydantoin, which are expected to produce functional changes in nerve membranes. Pretreatment of the rats with a single dose of DDT capable of producing neurological symptoms and repeated sub-lethal doses of DDT did not alter the fluorescence characteristics of the hydrophobic probe 8-anilino-1-naphthalene sulfonic acid (ANS) bound to the synaptosomes. DDT treatment also showed no effect on native protein fluorescence of synaptosomes. Exposure of synaptosomes to diphenylhydantoin *in vitro* did not induce conformational changes as measured by ANS and intrinsic fluorescence. (Author abstract by permission)

80-1754. Jackson, C. M. (Dep. Biol. Chem., Washington Univ., St. Louis, MO) **Mechanism of action of heparin and coumadin.** *Venous and Arterial Thrombois, Pathogenesis, Diagnosis, Prevention and Therapy. Proceedings of Postgraduate Symposium.* Joist, J. H. and Sherman, L. A., eds. (Grune & Strahon; NY): pp. 159-172; 1979 (29 references).

The mechanism of heparin anticoagulation is discussed and compared with that of the vitamin K antagonist drugs such as coumadin (warfarin). The chemical structure of heparin is reviewed. The catalytic nature of heparin as regards the inactivation of the clotting proteolytic enzyme by antithrombin III is discussed. Heparin acts through enhancement of the rate of antithrombin III inactivation of activated clotting factors, shutting off the reactions which propagate coagulation. Vitamin K antagonist drugs act in the liver. Action involves elimination of the Ca mediated clotting factor associated with the membrane surface and a subsequent loss of the coagulation acceleration associated with cell membranes. Post-ribosomal carboxylation of vitamin K dependent proteins, Ca binding to these proteins, and binding of these proteins to phospholipids of cell membranes are discussed. It is suggested that synergism between the mechanism of action of heparin and the vitamin K antagonist drugs may occur.

80-1755. Bookhout, C. G.; Costlow, J. D.; Monroe, R. (Dep. Zool., Duke Univ., Durham, NC 22706) **Kepone effects on larval development of mud-crab and blue-crab.** *Water Air Soil Pollut.* 13(1): 57-77; 1980 (27 references).

Experiments were conducted to determine the effects of Kepone (chlordecone) on the development of larval stages of the mud crab and the blue crab. Tests were run from hatching to first crab stage. Mud crabs were exposed to 5 concentrations, ranging from 35 to 125 ppb Kepone. Blue crabs were exposed to 4 concentrations from 0.1 to 1.0 ppb Kepone. For every 10 ppb Kepone added to mud crab tests, the duration of time to first crab stage increased by 0.39 days. For the blue crab, however, every 0.1 ppb Kepone resulted in a delay of 0.38 days. Sensitivity to Kepone varied with growth stages and crabs. The first and second zoeal stages of the mud crab were most sensitive, but for the blue crabs the first stage was not sensitive to any of the test concentrations. Zoeal stages II, III, and IV of blue crab development showed increased mortality over stage I at every concentration of Kepone.

80-1756. Richardson, J. T.; Frans, R. E.; Talbert, R. E. (Monsanto Chem. Co., Holt, MI 48842) **Reactions of *Euglena gracilis* to fluometuron, MSMA, metribuzin, and glyphosate.** *Weed Sci.* 27(6): 619-624; 1979 (20 references).

Investigations were conducted on *Euglena gracilis* Klebs strain Z to determine the effects of fluometuron [1,1-dimethyl-3- (α,α,α-trifluoro-*m*- tolyl)urea], MSMA (monosodium methanearsonate), glyphosate [*N*-(phosphonomethyl)glycine], and metribuzin [4-amino-6-*tert*-butyl-3- (methylthio)-*as*-triazin- 5 (4*H*)-one] on cell number, chlorophyll content, and photosynthesis. Euglena cell number was reduced by 65% or more after 48 hr with fluometuron levels above 4×10^{-5} *M*. MSMA at 6×10^{-4} *M* reduced cell number 42% after 144 hr exposure. Chlorophyll content was reduced 33 to 80% by metribuzin levels of 2×10^{-6} *M* or greater, and fluometuron inhibited chlorophyll content by 30% or more from 4×10^{-6} *M* or greater concentrations. Chlorophyll was reduced 21 to 69% by treatment with glyphosphate at 3×10^{-3} *M*, but MSMA appeared to have little effect on chlorophyll except at the high level of 6×10^{-4} *M* at 48 hr. Photosynthesis was reduced 50% or more with metribuzin levels above 9×10^{-7} *M* and with fluometuron above 9×10^{-5} *M*. MSMA reduced photosynthesis by 20% at the 6×10^{-3} *M* level, and glyphosate slightly stimulated it above that level. Chronic effects (*Euglena* exposed to herbicides 96 hr prior to measurement) on photosynthesis indicated a more pronounced reduction from fluometuron than from short-term exposure, little change with glyphosate, but less reduction with metribuzin than from short-term exposure. Metribuzin caused increased respiration rates of 100 to 200% after 100 min of exposure. Respiration was stimulated 20% by glyphosate and relatively unaffected by the other compounds. Removal of *Euglena* from metribuzin- and fluometuron-treated media to non-treated media resulted in increased level of chlorophyll to near that of the control. These results suggest that use of these herbicides is not detrimental to non-target algae if the exposure is not intensive. (Author abstract by permission)

80-1757. Kelley, W. D. (Auburn Univ., Auburn, AL) ***In vitro* effects of selected herbicides on growth of myocorrhizal fungi.** *Weed Sci. Soc. Am. Meeting:* p. 38; 1978.

The fungi *Laccaria laccata, Pisolithus tinctorius, Suillus cothurnatus, S. nirtellus,* and *S. pinorigidus* were used to determine the effects of the herbicides atrazine, bifenox, diphenamid, napropamide, oryzalin, perfluidone,

prometryne, and trifluralin on microorganisms associated with pine seedlings. The herbicides were incorporated individually in agar at rates of 0, 1, 3, 10, 40, 80, 100 and 500 μg/ml, and radial growth of the fungus was measured after 1, 2, and 3 wk. In most cases, the three highest herbicide rates inhibited fungal growth. When the three lowest herbicide rates were applied, *L. laccata* was inhibited by trifluralin and bifenox, and was not affected by the others; *S. cothurnatus* was inhibited by bifenox, oryzalin, and perfluidone, and was not affected by the others; *S. nirtellus* was stimulated by trifluralin, and was not affected by the others; *S. pinorigidus* was stimulated by atrazine and bifenox, inhibited by perfluidone, prometrye, and trifluralin, and not affected by the others; *P. tintorius* was stimulated by diphenamid and perfluidone, inhibited by bifenox, napropamide, and oryzalin, and not affected by the others.

80-1758. Schwarz, M. (Author address not given) **Untersuchungen ueber die Verteilung von intravenoes injiziertem DDE im Fettgewebe von Masthaehnchen und Schweinen als Voraussetzung zur Koeperfettbestimmung am labenden Tier. [Studies regarding the distribution of intravenous DDE in fatty tissue of fattening chickens and swine as prerequisite for determining body fat in living animals.]** *Z. Tierphysiol. Tierernaehr. Futtermittelkd.* 42(1): 11-12; 1979 (German).

DDE (1,1-dichloro-2,2 bis p-chlorophenylethylene) injected into live cockerels was found to be distributed in their fatty tissues evenly within 24 hr. In swine even distribution did not occur until 20 days following injection. These findings are important because DDE is used in the Luehrs and Henkel method as a tracer substance to determine body fat content in cockerels raised for meat and can be accurate only if the marker substance is distributed evenly in the fatty tissues being analyzed. High DDE concentrations took longer to become evenly distributed than low ones.

80-1759. Isaichev, V. V. (Timiriazev Agric. Acad., Moscow, USSR) **Vliianie pestitsidov na khishchnykh zhuzhelits. [Effect of pesticides on predaceous ground beetles.]** *Zach. Rast. (Moscow)* (11): 35; 1978 (Russian).

A method for determining toxicity of pesticides to nontarget predaceous carabid beetles is described. A total of 21 pesticides were tested. It was found that almost all fungicides and herbicides (except simazine) were nontoxic or weakly toxic to the beetles. Carbophos (malathion), Tiodan (endosulfan), Antio (formothion), phosphamidon, and simazine were midly toxic (31-60% mortality), while Bazudin (diazinon), Sevin (carbaryl), Metathion (fenitrothion), Chlorophos (trichlorfon), and HCCH (BHC) were highly toxic (61-100% mortality).

See also 80-1501, 80-1502, 80-1503, 80-1504, 80-1507, 80-1508, 80-1509, 80-1510, 80-1512, 80-1519, 80-1533, 80-1535, 80-1536, 80-1538, 80-1542, 80-1544, 80-1545, 80-1546, 80-1547, 80-1549, 80-1550, 80-1551, 80-1554, 80-1559, 80-1561, 80-1571, 80-1572, 80-1578, 80-1597, 80-1602, 80-1619, 80-1631, 80-1632, 80-1642 *and* 80-1798.

80-1760. Kovac, J.; Henselova, M.; Sackmauerova, M. (Inst. Agrochem. Technol., Bratislava, Czechoslovakia) **Moznosti detekcie a stanovenia rezidui herbicidov v zivotnom prostredi technikou inhibice Hillovej reakcie. [Possibility of detection and determination of herbicide residues in the living environment by the inhibition of Hill's reaction.]** *Agrochemia* 20(1): 20-22; 1980 (21 references) (Slovak).

The potential of using selective biochemical detection based on the inhibition of the Hill reaction for determining herbicide residues in the environment is explored with the view of finding a simple semiquantitative procedure for determining herbicide mixtures directly from soil extracts, water or plants without the need of separating coextracts. Most commercial herbicides inhibit photosynthesis and inactivate chloroplasts. The photolytic activity of chloroplasts is expressed by the degree of reduction of a suitable electron acceptor manifested by a redox system color change, in this case the indicator 2,6-dichlorophenolindophenol. The soil extract, indicator solution and chloroplast homogenate are subjected to TLC, the presence of herbicides is manifested by the appearance of blue zones on a yellow-green background. The method is recommended for use in assessing the presence of herbicide residues in animal products.

80-1761. Zhemchuzhin, S. G. (Author address not given) **Metody analiza dipiridilovykh gerbitisidov. [Methods of analyzing dipyridyl herbicides.]** *Agrokhimiya* (7): 162-168; 1979 (70 references).

Various analytical methods currently used for the determination of dipyridylium herbicides are reviewed. Residues of diquat and paraquat in fruit and vegetable crops can be assayed photometrically. Modified techniques were described for determination of these herbicides in the animal tissues and milk. Gas-liquid chromatography was employed for the determination of diquat and paraquat in water and human blood plasma. Among the semiquantitative biological methods are highly sensitive aquatic plant bioassays.

80-1762. VanBuuren, C.; Lawrence, J. F.; Brinkman, U. A. T.; Honigberg, I. L.; Frei, R. W.* (Dep. Anal. Chem., Free Univ., NL-1081 HV Amsterdam, The Netherlands) **Reversed phase liquid chromatography of basic drugs and pesticides with a fluorigenic ion-pair extraction detector.** *Anal. Chem.* 52(4): 700-704; 1980 (11 references).

An ion-pair extraction detector for the sensitive and selective fluorescence detection of some basic drugs, pesticides, and their metabolites is described. The addition of the ion-pairing reagent dimethoxy anthracene sulfonate (DAS) prior to the column permits a drastic simplification of the detector design. The influence of the DAS concentration, pH buffer concentration, and organic polarity modifier (methanol) on the separation of the above compounds carried out in the reversed-phase mode on various chemically bonded materials has been studied. The flexibility of the system is such that the mobile-phase composition can be attuned for optimal detector performance. The technique is finally applied to the trace determination of hydroxyatrazine in urine. (Author abstract reprinted by permission of the American Chemical Society)

80-1763. Smith, R. M.; Morarji, R. L.; Salt, W. G.; Stretton, R. J. (Chem. Dep., Loughborough Univ. Technol., Loughborough, Leicestershire LE11 3TU, England) **Application of transition-metal salts as ion-pair reagents in the liquid chromatography of dithiocarbamates.** *Analyst (London)* 10(1247): 184-185; 1980 (8 references).

The transition metal salts of several dithiocarbamate compounds were analyzed by liquid chromatography with the use of transition metal ions as ion-pair reagents. Ten μl samples of *N*-methyl; *N*-ethyl; and *N,N*-dimethyldithiocarbamate (Na salts) were separated on a 5 μm Hypersil ODS column using Waters Associates 6000 pump and an ALC 202 detector at 254 nm. Analytical reagent grade nickel sulfate and cobalt nitrate were used as ion-pair reagents. The capacity factors of the dithiocarbamates and some related thiuram disulfides (thiram, disulfiram) in different solvent systems were determined.

80-1764. Lord, K. A.; Cayley, G. R.; Smart, L. E.; Manlove, R. (Rothamsted Exp. Stn., Harpenden, Herfordshire AL5 2JQ, England) **Assay of carbaryl in honey bees (*Apis mellifera*) by high-performance liquid chromatography.** *Analyst (London)* 105(1248): 257-261; 1980 (10 references).

A method for detecting and measuring carbaryl in poisoned honey bees (100 ng per bee) using high-performance liquid chromatography is described. Clean-up of extracts on a Florisil column removed all substances that interfered with fluorescence detection and most that affected ultraviolet detection at 215 nm. Gas chromatography of carbaryl derivatives was not consistently useful because bee constituents interfered either with the formation of derivatives or with detection. Only the *N*-acetyl derivative was formed quantitatively in the presence of cleaned-up bee extracts, but the nitrogen-specific detector was sometimes, and the electron-capture detector always, subject to interference from bee constituents remaining after clean-up. (Author abstract by permission)

80-1765. Baker, P. G.; Farrington, D. S.; Hoodless, R. A. (Dep. Ind., Lab. Gov. Chem., London SE1 9NQ,

England) **Fungicide residues. Part VII. Determination of residues of fentin in vegetables and cocoa products by spectrofluorimetry.** *Analyst (London)* 105(1248): 282-285; 1980 (9 references).

A method for the determination of residues of the fungicides fentin (triphenyltin) hydroxide or acetate in food samples is described. The recoveries of 0.003-1.0 mg/kg fentin hydroxide from potato, grated celery, grated sugar beet or cocoa products were checked by adding known volumes of a standard solution to portions of the sample and allowing the solvent (toluene) to evaporate. Food samples were placed in an extraction thimble containing 20 g anhydrous Na_2SO_4 and extracted in a Soxhlet apparatus with 100 ml dichloromethane. The extracts were passed through an alumina column, centrifuged and analyzed by spectrofluormetry at 420 and 500 nm using an excitation λ of 415 nm. Recoveries of fentin hydroxide from fortified potatoes were 98-100% and somewhat less in cocoa products. For celery and sugar beet samples fortified with 0.1 mg/kg fentin, recoveries were in the order of 50%. The practical level of determination was at the 0.05 mg/kg level.

80-1766. Brillinger, G. U. (Lehrstuhl Mickrobiol. I., Inst. Biol., Univ. Tubingen, D-7400 Tubingen, BRD) **Metabolic products of microorganisms 181. Chitin synthase from fungi, a test model for substances with insecticidal properties.** *Arch. Microbiol.* 121(1): 71-74; 1979 (14 references).

Possible inhibitors of insect chitin synthase were compared with nikkomycin, a known inhibitor of fungal chitin synthase in an assay to determine if chitin synthase is a suitable model for testing insecticides. Concentrations of 10^{-7} to 10^{-4} mol/l of test substances captan, Kitazin P (IBP), parathion, methyl parathion, and Dimilin (diflubenzuron) were reacted with 10 μl preparations of chitin synthase from the fungus *Coprinus cinereus.* With the exception of nikkomycin, which was a strong chitin synthase inhibitor, none of the compounds tested were found to be inhibitory.

80-1767. Wing, K.; Hammock, B. D. (Dep. Entomol., Univ. California, Riverside, CA 92521) **Immunochemical methods to detect pesticide residues.** *Ca. Agric.* 34(3): 34-35; 1980.

Immunochemical methods which have been shown to be useful in analyzing pesticide residues are discussed. Some of the methods commonly used in pesticide residue analysis (such as gas-liquid chromatography and high-performance liquid chromatography) are costly in both time and money, and thus not appropriate for analysis of compounds intended for minor uses. Immunological methods are highly specific and sensitive, require few clean-up steps, and are inexpensive. Immunochemical methods are based on the principle of competitive binding, and are thus physical rather than biological assays. Radioimmunoassay, which involves the addition of radiolabeled and non-radiolabeled pesticide to a specific antibody, is described, along with enzyme-linked immunosorbent assay and radial-immunodiffusion. Immunochemical assays have already been developed for a few pesticides (cyclodienes, parathion, S-bio-allethrin), and compare favorably with conventional assays in sensitivity and reproducibility. It is suggested that the advantages of immunoassays, including their ability to distinguish compounds based on stereochemistry, may lead to new uses for the methods, such as monitoring pesticide application methods and coverage.

80-1768. Guy, R. D.; Narine, D. R. (Trace Anal. Res. Cent., Dep. Chem., Dalhousie Univ., Halifax, Nova Scotia B3H 4J1, Canada) **Organocation speciation. II. Methylene blue photosensitization as a model for speciation and toxicity of herbicides.** *Can. J. Chem.* 58(6): 555-558; 1980 (13 references).

A chemical model that employs the photosensitization properties of methylene blue to mimic herbicide toxicity is used to test size separation as a method of chemical speciation. A spectrophotometric study of the dye interactions with the humic colloid indicated that the dye-humic acid complex has a weaker absorption than the free dye. The absorption spectra suggested that the binding sites on the humic acid are sufficiently isolated to prevent dye-dye interactions on the colloid surface. The dye photosensitization of tryptophan degradation indicated that only the free methylene blue was active in the presence of humic acid, clay, and separation by dialysis would be a satisfactory speciation procedure. (Author abstract by permission)

80-1769. Fatori, D.; Hunter, W. M. (MRC Immunoassay Team, Edinburgh EH1 2QW, Scotland) **Radioimmunoassay for serum paraquat.** *Clin. Chim. Acta* 100(2): 81-90; 1980 (11 references).

The development of radioimmunoassay methods for the determination of paraquat in serum samples is described. These methods are useful in choosing therapy in cases of paraquat ingestion and for monitoring serum paraquat levels during treatment. The 2 methods described both employ antiserum raised to paraquat BSA which has been covalently linked to a particulate solid-phase material to effect simple separation procedures. The first method, which is a rapid assay for clinical use, employs a [^{3}H] paraquat tracer, requires no agitation, and gives results in the range of 10-2500 ng/ml serum within 20 min. The second method, designed for toxicology research studies, employs a ^{125}iodinated tracer and requires 2 hr continuous agitation, but can detect paraquat at 0.1 ng/ml in simple aqueous solution or 0.25 ng/ml serum. The results obtained with the rapid method compare favorably with the existing colorimetric method, and is considered to be more sensitive

and more practical for large numbers of samples than the colorimetric method.

80-1770. Eriksson, H.; Faijersson, Y. (Dep. Biochem., Arrhenius Lab., Univ. Stockholm, S-10691 Stockholm, Sweden) **A reliable way of estimating cholinesterases from whole blood in the presence of anti-cholinesterases.** *Clin. Chim. Acta* 100(2): 165-171; 1980 (8 references).

A spectrophotometric method for the determination of cholinesterase activities in whole blood samples was adapted to monitor these enzymes in the presence of anticholinesterase insecticides. Whole blood or whole blood incubated with anticholinesterases 2,2-dichlorvinyl dimethyl phosphate (dichlorvos) or eserine salicylate was applied to filter paper and allowed to dry before being eluted with water (plasma cholinesterase) or with 1% Triton X-100 (erythrocyte acetylcholinesterase). Complete recovery of the enzyme activity was obtained with this method. Cholinesterase activity was then determined spectrophotometrically at 324 nm. It was seen that it was possible to store samples at room temperature for at least 2 wk or in a refrigerator for more than 6 wk without decreasing the elution efficiency. Blood samples treated with anticholinesterase insecticides and stored on filter paper showed the same inhibition of cholinesterase after being stored at room temperature or deep frozen for 1 wk, as at the start of the experiment. However, samples stored at room temperature in tubes recovered cholinesterase activity within a day. This modification of the method (storing dried blood spots on filter paper) can be useful when samples must be mailed.

80-1771. Georgievskii, V. P. (Kharkov Chem. & Pharmacol. Res. Inst., Kharkov, USSR) **Do pitannya pro identifikatsiyu pokhidnikh kumarine. [UV spectroscopic identification of coumarin derivatives.]** *Farm. Zh. (Kiev)* (3): 65-68; 1978 (2 references) (Ukrainian).

The UV spectroscopic identification of 21 oxycoumarins was studied in ethyl alcohol. The identification factor, $f_{visibles}$ is the product of the difference of the absorption peaks of the coumarin derivative and of coumarin in the long-wave and short-wave range by the difference of the molar absorption coefficients of the coumarin derivative and coumarin. It was found possible to identify all 21 compounds of the basis of their visible values. This value was found to be 14.04 ± 0.35 for zoocoumarin (warfarin).

80-1772. Aleksandrova, L. G. (Res. Inst. Vocat. Hyg. & Occup. Dis., Kiev, USSR) **Opredelenie mikrokplichestv Bazudina v vozdukhe. [Determination of trace amounts of Bazudin in air.]** *Gig. Sanit.* 44(12): 40-42; 1979 (7 references) (Russian).

A method of determination of trace amounts of the pesticide Bazudin (diazinon) in the air of the working zone is presented. The method is based upon sampling of air specimens on the solid sorbent (silica gel) or liquid absorbent (hexane, acetone or methanol), extraction from the absorbent media, and analysis by thin layer or gas-liquid chromatography. The technique was used for determination of contamination of the air after spraying of sugar beet and potato fields with a 40% wettable powder of Bazudin (1.5-2.0 mg/ha). Samples of air were taken 2-2.5, 6 and 10 hr after the treatment, as well as on days 1-6 and 14. It was found that 2-3 hr after the treatment, concentration of Bazudin did not exceed MPC (maximum permissible concentration).

80-1773. Krasnykh, A. A.; Shvets, D. A. (All-Russian Res. Inst. Plant Prot., Voronezh, USSR) **Opredelenie Valeksona metodom tonkosloinoi khramatografii. [Determination of Valekson by thin-layer chromatography.]** *Gig. Sanit.* 44(12): 50-51; 1979 (3 references) (Russian).

A method of determination of the insecticide Valekson (phoxim) by thin-layer chromatography is described. The technique is based upon extraction of the insecticide by organic solvent (n-hexane, chloroform, or petroleum ether), sedimentation of coextractive substances by coagulating solution, and chromatography in a thin layer of Silica gel L5/40m. Sensitivity of the method is 1-3 μg of insecticide in a 20 g sample of grain, grass, or vegetables. Extractability is 90-95%.

80-1774. Vollner, L.; Korte, F. (Inst. Okol. Chem., Gesellschaft Strahlen & Umweltforschung mbH Muenchen, D-8042 Neuherberg, BRD) **Fingerprint analyses of plant and animal tissues with respect to the occurrence of foreign compounds.** *Int. J. Environ. Anal. Chem.* 7(3): 191-204; 1980 (27 references).

A method is described for the analysis of plant and animal samples with respect to the occurrence of unknown foreign compounds, using a fingerprint type method. For plant studies, lettuce served as the matrix for pentachlorophenol (PCP). For animal tests several tissues from rhesus monkeys dosed with hexachlorobenzene (HCB) and a liver sample from a chimpanzee dosed with 13 compounds were used. After homogenization the samples were extracted with ethyl acetate. Clean-up was by a counter-current distribution system, followed by glass capillary chromatography. A special splitless injection system, which prevents any loss at injection and provides good reproducibility of fingerprint patterns, was used. An electron capture detector was employed to determine organochlorine substances in trace amounts. At each step, the procedure was checked using radioactivity labelled substances. The internal standards PCP and HCB were easily extracted with a yield of over 90%. Concentrations

of 10 to 100 ng/μl can be characterized. Fingerprint patterns are presented for the various samples.

80-1775. Colenutt, B. A.; Thorburn, S. (Sch. Chem., Brunel Univ., Uxbridge, Middlesex, England) **Optimization of a gas stripping concentration technique for trace organic water pollutants.** *Int. J. Environ. Anal. Chem.* 7(3): 231-244; 1980 (15 references).

A gas stripping concentration technique, for use prior to analysis of trace organic water pollutants, is presented. Solutes are stripped from solution by a stream of inert gas and adsorbed onto active carbon, from which they are taken up in a solvent for analysis. The method was tested using various chlorinated pesticides and polychlorinated biphenyls. Gas chromatography was used to monitor the efficiency of the stripping technique. Recoveries of pesticides were generally good, ranging from 80% for lindane with diethyl ether as solute to 96% for aldrin with carbon disulfide or carbon tetrachloride as solute. The effects of gas flow rate, time of stripping, adsorbent particle size, and desorbing solvent on the percentage recovery are discussed, along with problems of contamination of aqueous solutions by absorption of atmospheric vapors prior to analysis.

80-1776. Zanini, E.; Barberis, E.; Ronco, C. (Inst. Agric. Chem., Univ. Turin, I-10126 Torino, Italy) **Gas chromatographic determination of vinclozolin and endosulfan in strawberries.** *J. Agric. Food Chem.* 28(2): 464-466; 1980 (7 references).

A gas chromatographic method is described for the determination of vinclozolin and endosulfan residues in strawberries. After extraction by acetone homogenization and cleanup by Florisil column chromatography, vinclozolin and endosulfan isomers I and II were identified by using an electron-capture detector. Recovery of vinclozolin averaged 93 ± 16% from the various samples fortified at levels ranging from 2.1 to 26.4 ppb. Quantitative recoveries of endosulfan I (91 ± 14%) and endosulfan II (87 ± 24%) at different levels of fortification were also obtained. The detection limit was 0.05 ng for vinclozolin and 0.04 and 0.2 ng for endosulfan I and II. (Author abstract reprinted by permission of the American Chemical Society)

80-1777. Sattar, M. A.; Paasivirta, J. (Dep. Chem., Univ. Jyvaskyla, SF-40100 Jyvaskla 10, Finland) **Thin-layer chromatography of 2-methyl-4-chlorophenoxyacetic acid and its soil metabolites.** *J. Chromatogr.* 189(1): 73-78; 1980 (33 references).

The thin-layer chromatography of 2-methyl-4-chlorophenoxyacetic acid (MCPA), 4-chloro-*o*-cresol and 3-methyl-5-chlorocatechol and their pentafluorobenzyl derivatives has been studied on silica gel as the adsorbent with 19 solvent systems. The best separation of the individual components occurred with toluene: benzene: acetic acid (2:2:1). Chloroform: diethyl ether: toluene (1:1:1) was suitable for the group separation of the pentafluorobenzyl derivatives. (Author abstract by permission)

80-1778. Sass, S.; Parker, G. A. (Res. Div., Chem. Syst. Lab., Aberdeen Proving Ground, MD 21010) **Structure-response relationship of gas chromatography flame photometric detection of some organophosphorus compounds.** *J. Chromatogr.* 189(3): 331-349; 1980 (16 references).

A variety of organophosphorus compounds was studied with respect to their response to the gas chromatographic flame photometric detector. Contrary to the experience of some investigators, the molar response of phosphorus was found to be linear only within homologous series. Compounds containing the dialkylaminoalkyl moiety on phosphorus are in the low sensitivity (50% of normal molar sensitivity) range. Some compounds such as phosphodihalides (fluoro or chloro) are 30% or more above the norm. Comparative data are given for selected compounds on the flame ionization and thermionic nitrogen-phosphorus detectors. A postulated mechanism is given for explaining some of the differences. (Author abstract by permission)

80-1779. Brown, P. M.; Uppal, G. S. (Tolworth Lab., Minist. Agric. Fish. & Food, Surbiton, Surrey KT6 7NF, England) **Improved clean-up procedure for the determination of small residues of carbophenothion in mice.** *J. Chromatogr.* 190(1): 201-202; 1980 (3 references).

A method to clean-up field trapped mice samples for carbophenothion GC analysis is presented. Five g tissue samples are ground with anhydrous Na_2SO_4 and sand to a fine powder and Soxhlet extracted for 16 hr with diethyl ether. The solvent is removed by rotary evaporation under reduced pressure. The sample extract residue is dissolved in *n*-hexane and eluted through an activity III acid alumina column with 5% (v/v) acetone in hexane. For carbophenothion residues above 0.1 ppm in the original samples, 5 μl aliquots of the eluate are sufficient. If the extract is further concentrated, lower residues may be detected, however, the carbophenothion peak will be slightly broadened. The lower limit of detection was 0.002 μg carbophenothion/g tissue. Fortified samples gave 85-90% recoveries.

80-1780. Lanouette, M.; Pike, R. K. (Lab. Ser. Div., Agric. Canada, Ottawa, Ontario K1A OC5, Canada) **Analysis of aminocarb formulations by high-performance**

liquid chromatography. *J. Chromatogr.* 190(1): 208-211; 1980 (5 references).

Five (ca. 0.1 g) samples of 4 commercial spray formulations of aminocarb were examined in a Waters M6000 analytical pump coupled to a Waters dual-channel 440 UV detector and a Rheodyne 7105 closed-loop injection valve. The recorder used was a Westronics 10 mV at 15 in/hr chart speed. The UV detector was used at 254 nm. The *ca.* 0.1 g samples were measured into 100 ml volumetric flasks made up to volume with absolute methanol and 5 μl aliquots were used for analysis. Each replicate was injected 3 times and after every third injection, 5 μl of standard were injected. Six aminocarb formulations were also examined by UV and electron capture detection (ECD). The percentage of aminocarb in a formulation was determined by a formula of the ratios of the mean peak areas of the sample to that of the standard and the concentration of the standard to the weight of the sample multiplied with the percent purity of the standard. Average aminocarb % in the four spray formulations ranged from 6.74 to 6.89 ± 0.07 to 0.14 (SD). The mean analytical value of an additional 44 formulations examined by LC was 6.47 ± 0.45. Recommended standard aminocarb % is 6.8%. Aminocarb % in the six formulations averaged 19.1 ± 0.45 by UV detection and 19.32 ± 0.72 by ECD. Label information indicated the presence of 19.5% aminocarb in these 6 formulations.

80-1781. Games, D. E.; Weerasinghe, N. C. A. (Dep. Chem., Univ. Coll., Cardiff CF1 1XL, Wales) **Analysis of the metabolites of CIPC (chloropropham).** *J. Chromatogr. Sci.* 18(3): 106-107; 1980.

Liquid chromatography and mass spectrometry (LC/MS) have been combined to study metabolic products of the carbamate insecticide chloropropham in extracts of rat urine and plants. The studies were carried out with an interface of the moving belt type using a Kapton belt and utilizing both EI and CI. Excellent EI and CI spectra were obtained for all components of a mixture of chloropropham and possible metabolic products. Total ion current (TIC) traces are presented and NH_3 CI spectra are given. Three metabolites were identified in the urine of rats dosed with chloropropham.

80-1782. Skinner, R. F.; Thomas, Q.; Giles, J.; Crosby, D. G. (Finnigan Corp., Sunnyvale, CA 94086) **The determination of herbicide photolysis products by LC/MS.** *J. Chromatogr. Sci.* 18(3): 108-109; 1980.

The separating power of liquid chromatography (LC) has been combined with the capability of mass spectrometry (MS) for specific identifications to determine the photolytic degradation products of the herbicide oryzalin (3,5-dinitro-N^4,N^4-dipropylsulfanilamide) . A 100 mg sample of oryzalin dissolved in acetone was slurred with finely divided soil, and the solvent evaporated. The oryzalin impregnated dust was then exposed to the sun for 1 wk. The oryzalin and the photolytic decomposition products were washed from the soil with methanol, and the extracts filtered and concentrated. The operating conditions for LC/MS are given. Mass spectrometry showed the presence of 5- and 6-membered ring products. The negative ion chemical ionization (NICI) spectra proved to be the most sensitive mode of ionization, and gave strong molecular anions, and easy to interpret structure information. The positive ion chemical ionization and EI data were more difficult to interpret, but were useful in confirming the NICI results.

80-1783. Mayer, R. T.; Meola, S. M.; Coppage, D. L.; DeLoach, J. R. (Vet. Toxicol. & Entomol. Res. Lab., Agric. Res., SEA, USDA, College Station, TX 77840) **Utilization of imaginal tissues from pupae of the stable fly for the study of chitin synthesis and screening of chitin synthesis inhibitors.** *J. Econ. Entomol.* 73(1): 76-80; 1980 (19 references).

Imaginal epidermal tissues from 4-day-old pupae of *Stomoxys calcitrans* (L.) were used to develop an assay suitable for studying chitin synthesis and for screening chitin synthesis inhibitors. Four chitin precursors, *D*-glucose, *D*-glucosamine, *D*-fructose, and *N*-acetyl-*D*-glucosamine were found to be suitable substrates in this assay system. All these substrates were incorporated into chitin. Maximum incorporation occurred within 8 hr or less. The apparent I_{50}'s of diflubenzuron, Bay Sir 8514 {2-chloro-*N*-[[[4-(trifluoromethoxy)phenyl] amino]carbonyl]benzamide}, EL-494 {N-[[[5-(4-bromophenyl)-6-methyl-2-pyrazinyl]-amino]carbonyl]-2,6-dichlorobenzamide}, and polyoxin D for inhibition of NAGA incorporation were found to be 52,440, 8600 and 13,000 n*M*, respectively. (Author abstract by permission)

80-1784. Guarnieri, M.; Guarnieri, S. R. (Chem. Determinations Med., Baltimore, MD) **Agricultural toxicology: a growing challenge for the clinical laboratory.** *Lab. Med.* 11(3): 165-169; 1980 (10 references).

Routine toxicological methods for the detection of pesticides in suspected poisoning cases are described. Among analytical methods currently used are chromatographic techniques (TLC, GC, GC/MS, and HPLC). The GC/MS methods promise definitive identification of unknown compounds. HPLC is the fastest and easiest to use, but is limited to analyzing certain classes of compound. The TLC methods are less subject to interferences than any other chromatographic methods. Two TLC methods used to detect cholinesterase-inhibiting organophosphorus and carbamate insecticides are briefly described. The level of detection for chlorinated hydrocarbons [such as aldrin, BHC, DDT, dieldrin, and Kelthane (dicofol)] and organophosphate and carbamate pesticides (diazinon, disulfoton, ethion, parathion, and carbaryl)

with TLC methods is from 0.1-50 ng, and 0.01-10 ng by GC with electron capture or nitrogen-phosphorus detectors.

80-1785. Noble, R. M. (Agric. Chem. Branch, Dep. Primary Ind., Indooroopilly, Queensland 4068, Australia) **A spectrophotometric method for the analysis of cotton flower buds for gossypol.** *Lab. Pract.* 29(2): 139-140; 1980 (5 references).

Gossypol is a polyphenolic naphthyldialdehyde plant derivative with insecticidal and insect sterilizing properties. A method is described which allows the rapid estimation of gossypol in cotton flower buds by spectrophotometric means. In the past, gossypol has been estimated spectrophotometrically by complexing with aniline. This new approach calls for both the formation of dianilinogossypol and its extraction into an organic phase at a concentration suitable for direct spectrophotometric determination to be carried out in a single tube at 438 nm. In the heating step for complex formation a controlled temperature water bath is employed. These steps effectively cut the time required for analysis in half. After lyophilization and grinding of samples have been accomplished, 50 analyses may be conducted by a single operator per day. An NMR method is used for checking purposes to ensure that gossypol is the only major terpenoid aldehyde present in the samples.

80-1786. Greve, P. A.; Hogendoorn, E. A. (Unit Residue Anal., Natl. Inst. Public Health, Bilthoven, The Netherlands) **Determination of residues of ethylene bisdithiocarbamates (ETU-precursors) as 1,2-bis(pentafluorobenzamido) ethane.** *Meded. Fac. Landbouwwet. Rijksuniv. Gent* 43(2): 1263-1266; 1978 (9 references).

Crops of endive and leek were spiked with 2 ethylene bisdithiocarbamates, maneb and zineb. Maneb was dosed at 0.56 and 5.6 mg/kg; zineb at 0.38 and 3.8 mg/kg. A residue analysis method which calls for acid hydrolysis of the samples in the presence of tin (II) chloride with subsequent derivatization of the ethylene diamine formed into 1,2-bis(pentafluorobenzamido) ethane was used. This method allows for separation of the ethylene bisdithiocarbamates from other dithiocarbamates. The recoveries and reproducibility of the proposed method are generally acceptable except for cases of very low zineb levels.

80-1787. Shimogata, M.; Koyama, K.; Ueda, K. (Sch. Hyg. & Dent., Fac. Odontol., Showa Univ., Tokyo, Japan) **[Microdetermination of paraquat dichloride in blood.]** *Nippon Eiseigaku Zasshi (Jpn. J. Hyg.)* 35(1): 172; 1980 (2 references) (Japanese).

A quick determination method for paraquat in blood has been developed that requires only a small amount of patient serum. A 1 ml solution containing 2 or 10 ppm ethyl paraquat (instead of the conventional internal standard anisidine) is added to 3 ml serum, is deproteinized by 1 ml of an aqueous trichloroacetic acid solution (25%) and this is then centrifuged for 10 min at 3000 rpm. The supernatant liquid is adjusted with 4*N* NaOH and reduced with 200 mg sodium borohydrate at 60°C for 30 min. After cooling, the reaction mixture is extracted 2 times with 5 ml ether and the residue is dissolved in methanol. The methanol solution is then used for gas chromatographic analysis on a 5% PEG + 5% KOH/Chromosorb GHP (mesh 80/100) column where the column temperature is 190°C and He is used as the carrier gas. Recovery of paraquat from fortified serum is 87.5%.

80-1788. Kirvukhin, Y. I.; Sinitsyna, Z. A.; Bagdasaryan, R. S. (Author address not given) **Spectra and extinction coefficients for $S_n \leftarrow S_1$ absorption of naphthalene and pyrene in the UV region.** *Opt. Spectrosc. (USSR)* 46(5): 916-919; 1979 (8 references).

This journal is a cover to cover translation of *Optika i Spektroskopiya.* For the abstract of this paper see *Pesticides Abstracts* 80-1790.

80-1789. Zalesskaya, G. A.; Lastochkina, V. A. (Author address not given) **Study of vibrational relaxation of naphthalene molecules in nonpolar solvents by the Raman spectra.** *Opt. Spectrosc. (USSR)* 47(2): 306-309; 1979 (13 references).

This journal is a cover to cover translation of *Optika i Spektroskopiya.* For the abstract of this paper see *Pesticides Abstracts* 80-1791.

80-1790. Kirvikhin, Y. I.; Sinitsyna, Z. A.; Bagdasaryan, K. S. (Author address not given) **Spektry i koeffitsienty ekstinktsii $S_n \leftarrow S_1$ pogloshcheniya haftalina i pirerna v uf oblasti. [Spectra and extinction coefficients for $S_n \leftarrow S_1$ absorption of naphthalene and pyrene in the UV region.]** *Opt. Spektrosk.* 46(5): 916-919; 1979 (8 references) (Russian).

Use of the pulsed laser excitation method for determination of the spectra and extinction coefficient for the $S_n \leftarrow S_1$ absorption of naphthalene and pyrene in the UV region is described. Measurements were taken at 20°C using a laser pulse photolysis apparatus. The excitation source was the fourth harmonic of an Nd-doped YAG laser. The kinetics of the reaction involved are discussed in detail, as are the calculations required to determine the extinction coefficient of $S_n \leftarrow S_1$ transitions. The spectrum of $S_n \leftarrow S_1$ absorption of naphthalene in hexane is given, as are the extinction coefficients of $S_n \leftarrow S_1$ transitions for solutions of pyrene in hexane.

80-1791. Zalesskaya, G. A.; Lastochkina, V. A. (Author address not given) **Issledovanie kolebatel'noi relaksatsii molekul naftalina v nepolyariykh rastvoritelyakh po spektram kombinatsinnogo rasseyaniya. [Study of vibrational relaxation of naphthalene molecules in nonpolar solvents by Raman spectra.]** *Opt. Spektrosk.* 47(2): 306-309; 1979 (13 references) (Russian).

Raman spectroscopy was used for certain vibrations of the naphthalene molecule to study the duration of the vibrational relaxation process, the nature of the damping of vibrations, and the effect of the surroundings on the vibrational relaxation process in nonpolar solvents. The profiles of the isotropic and anisotropic components of 4 A_{1g} type bonds of naphthalene in pentane, hexane, heptane and CCl_4 were studied. Polarization measurements were made on a Ramalog instrument with a dual argon-laser monochromator, a cooled photomultiplier, and a photon counter. Results from studying the vibrational relaxation process shows that with such large organic molecules as naphthalene, which has 48 normal vibrations, vibrational relaxation can take place 3-4 times faster than reorientational relaxation. Correlation between the reorientation time of naphthalene molecules and the viscosity of the media is noted, and possible channels for exchange of vibrational energy are discussed.

80-1792. Holt, R. F. (Biochem. Dep., Res. Div., Exp. Stn., E. I. duPont de Nemours & Co. Inc., Wilmington, DE 19898) **Determination of residues of 1-(2-cyano-2-methoxyiminoacetyl) -3-ethyl urea (DPX-3217) by gas-liquid chromatography.** *Pestic. Sci.* 10(6): 455-459; 1979 (2 references).

Residues of the fungicide 1-(2-cyano-2-methoxyiminoacetyl) -3-ethyl urea (DPX-3217) in grapes, potatoes, tomatoes and wine were determined by initial extraction with ethyl acetate, clean-up by liquid-liquid partitioning and adsorption chromatography, and final determination by gas-liquid chromatography with a nitrogen-selective detector. The sensitivity of the method was 0.04 mg/kg based on 50 g samples. Recoveries of the compound added to untreated substrates averaged approximately 92% in the range of 0.04-5.0 mg/kg. (Author abstract by permission)

80-1793. Johnson, J. S.; Pickering, G. B. (Trop. Prod. Inst., London WC1X 8LU, England) **Estimation of residues of the molluscicide, niclosamide, in bananas by gas-liquid chromatography of the heptafluorobutyryl derivative of the substituted aniline moiety.** *Pestic. Sci.* 10(6): 531-539; 1979 (19 references).

A sensitive method for the detection and estimation of residues of the molluscicide, niclosamide (clonitralide), in bananas is described. The procedure involves extraction of the molluscicide, purification of the extract by solvent partition and column chromatography, formation of the heptafluorobutyryl derivative of 2-chloro-4-nitroaniline in 99% yield and determination of the derivative by gas-liquid chromatography with electron capture detection. Recoveries from fortified bananas were 89 and 79% at levels of 0.02 and 0.2 mg/kg, respectively. The sensitivity of the method was such that 0.6 pg of the pure derivative could be detected, based on twice the background noise level on the chromatograph. (Author abstract by permission)

80-1794. Jean-Jean, P. (Lab. Pharmacognosie, Fac. Pharm., F-69373 Lyon Cedex 2, France) **Determination d'une eventuelle pollution des plantes medicinales par les herbicides, mise au point methodologique. [Determination of contamination of medicinal plants by herbicides: methodology.]** *Plant. Med. Phytother.* 12(4): 267-280; 1978 (12 references) (French).

A step-by-step procedure for the gas chromatography of herbicide residues in medicinal plants in presented. Extraction with methanol, purification (extraction of the methanol phase by 2 solvents of different pH, passage through Florisil column) and separation, identification and quantitative determination of herbicides was carried out on a mixture of simazine, prometryn, linuron and captan. The method can be used on all dried material for the simultaneous analysis of a great number, but not all, herbicides. The method is concluded to be adequate for the most frequently used herbicides, those extractable by water (medicial plants are mostly used to prepare infusions) and the most toxic herbicides.

80-1795. Bird, C. W.; Khan, R. (Dep. Chem., Queen Elizabeth Coll., London W8 7AH, England) **Some regioselective reactions of photoaldrin and photodieldrin.** *Tetrahedron* 36(4): 525-528; 1980 (13 references).

Some reactions of photoaldrin and photodieldrin, which enter the environment as a result of photochemical modifications of the insecticides aldrin and dieldrin, were studied. Regioselection reactions of these compounds with some typical electrophiles were carried out. Appropriate interconversion and syntheses established the structures of the resulting products. ^1H NMR, ^{13}C NMR, and IR spectra were recorded. Among the reactions carried out were the addition of acetic acid to photoaldrin and the treatment of photodieldrin with hydrobromic acid or acetic anhydride. The factors responsible for the observed regioselectivities were discussed.

80-1796. Bird, C. W. (Dep. Chem., Queen Elizabeth Coll., Campden Hill, London W8 7AH, England) **The**

reaction of aldrin, photoaldrin, and isodrin with phthaloyl peroxide. *Tetrahedron* 36(4): 535-537; 1980 (13 references).

The reactions of aldrin, photoaldrin and isodrin in carbon tetrachloride with phthaloyl peroxide are described in detail. IR, ^1H NMR and ^{13}C NMR spectra were recorded. The reaction of aldrin and photoaldrin yielded the respective carbon tetrachloride adducts, epoxides and cyclic phthalates of the corresponding cis-diols. Isodrin under the same reaction conditions produced the half-cage ketone, the phthalate and the novel half-cage adduct. Possible pathways for the production of these metabolites are discussed.

80-1797. Suprock, J. F.; Vinopal, J. H.; Heller, J. M. (Environ. Hyg. Ag., US Army, Aberdeen Proving Ground, MD) **Pesticide monitoring study. Evaluation of silicic acid column pesticide polychlorinated biphenyl separation procedure: recovery and elution patterns of 24 pesticides and pesticide metabolites and 2 polychlorinated biphenyls.** *US NTIS AD Rep.* AD-A067,149: 21 pp.; 1979 (3 references).

This report presents silicic acid column recovery and elution characteristics for 24 pesticides and pesticide metabolites and 2 polychlorinated biphenyls. The average percent recoveries for all except a few compounds studied were essentially quantitative. The average percent relative standard deviation of the procedure for all but a few compounds studied was within 10%. All compounds studied, except for toxaphene, Aroclor 1260, and technical chlordane, eluted in only one fraction. An in-depth discussion of the elution characteristics and the quantitation techniques for the above three compounds is presented. (Author abstract by permission)

80-1798. Friedman, A. A.; Coburn, C. B. (Water Resources Res. Cent., Tennesse Univ., Knoxville, TN) **Development of a rapid tissue bioassay technique for screening pollutant effects on fish.** *US NTIS PS Rep.* PS-79,0976: p. 16; 1979.

A rapid and relatively inexpensive tissue respirometric method for assessing the toxic effect of some classes of pollutants on fish has been developed and tested. It appears that fish liver homogenate respirometry is comparable with conventional fish bioassay with systemic toxicants other than those which primarily interfere with gas transfer mechanisms in the gill or are neurotoxicants (including pesticides). The response patterns of liver respirometry were similar in different species of fish and at different temperatures. Liver homogenates frozen in Krebs-Ringer's phosphate had a viability over 6 mo when stored at -20°C. (Author abstract by permission)

80-1799. Walsh, G. E.; Alexander, S. V. (Environ. Res. Lab., US EPA, Gulf Breeze, FL 32561) **A marine algal bioassay method: results with pesticides and industrial wastes.** *Water Air Soil Pollut.* 13(1): 45-55; 1980 (9 references).

A marine algal bioassay method for pesticides and industrial wastes is presented. Single species and multiple species tests were conducted for rapid screening of possible toxicants. The toxicity of a series of pesticides and 3 industrial wastes were determined. Culture medium (25 ml) was placed into tubes that fit into a spectrophotometer. After autoclaving, 0.1 ml of pesticide and 1 ml of algal suspension with known cell density were added. Cells were incubated at 20°C under 4000 lux. EC50 values obtained using *Skeletonema costatus* were 340 μg/l for EPN, 109 μg/l for carbophenothion, 366 μg/l for DEF, 8.4 mg/l for ethoprop, 5.3 mg/l for methyl parathion, and 1.3 mg/l for phorate. Long term tests resulted in EC50 values for carbaryl ranging from 1.2 ppm for *Chlorella* sp. to 2.7 ppm for *Chlorococcum* sp. Algal species sensitive to neburon in monoculture were found to be less sensitive when grown in mixed culture with resistant species. It is suggested that resistant species may adsorb the pesticide, reducing the concentration in the growth medium. Liquid industrial wastes either stimulated growth, inhibited growth or acted as stimulants at low concentrations, but inhibited growth at high concentrations.

80-1800. Zandvoort, R.; Van Dord, D. C.; Leistra, M.; Verlaat, J. G. (Cent. Agrobiol. Res., Wageningen, The Netherlands) **The decline of propyzamide in soil under field conditions in the Netherlands.** *Weed Res.* 19(3): 157-164; 1979 (10 references).

Two bioassay methods for determining the amount of propyzamide in soil were evaluated and compared with analysis by gas-liquid chromatography. The root length assay with flax (*Linum usitatissimum* L.) as well as the more time-consuming shoot assay with canary grass (*Phalaris canariensis* L.) were sufficiently accurate when carried out under favorable growing conditions. However, gas chromatography with electron-capture detection was more sensitive to low concentrations of propyzamide and also to moderate concentrations when the soil organic matter content was high. As the organic matter content of the soil increases, propyzamide becomes less available to plants. The rate of decline does not seem to be influenced by the type of soil. A few months after autumn treatment, the rate of disappearance of propyzamide was fairly high in the field, even at low temperatures. The rates of decline under summer conditions were in the expected range. When selecting the next crop, it should be taken into account that propyzamide residues may be present in the soil for several months after application. (Author abstract by permission)

See also 80-1501, 80-1513, 80-1519, 80-1540, 80-1668 *and* 80-1682.

PESTICIDES ABSTRACTS

QUARTERLY INDEX

APRIL — JUNE 1980 Vol. 13 Nos. 4 - 6

PREFACE

The basic design for this index was supplied by the Chemical Information Division, Office of Pesticides and Toxic Substances, Environmental Protection Agency. It consists of two subject indexes (concept and compound) and two author indexes (personal and corporate). Primary and secondary headings in the Concept Index appear as subordinate headings in the Compound Index, both indexes having three levels of specificity.

In the Concept Index, only general aspects are indexed under the broader terms shown below. For specific terms, the reader should consult the appropriate heading in the Concept Index, selecting the narrower term that best fits his need.

Compounds are indexed by their common names; where other designations are used by authors, these synonyms appear with the notation to *see* the common name. Articles referring, in general, to structural or functional chemical classes are indexed under the broader headings (e.g., organochlorines, herbicides, etc.).

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Cardiovascular system
Cytological effects (*see also* Mutagenesis)
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Economics
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Experimental design
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Residue degradation (*see also* Photodecomposition, Thermodecomposition *and* Biotransformation)
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☆ U. S. GOVERNMENT PRINTING OFFICE : 1980—620-372/14

The Administrator of the U.S. Environmental Protection Agency has determined that the publication of this periodical is necessary in the transaction of public business required by law of this Agency. Use of funds for printing this periodical approved by the Director of the Office of Management and Budget February 6, 1973.

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